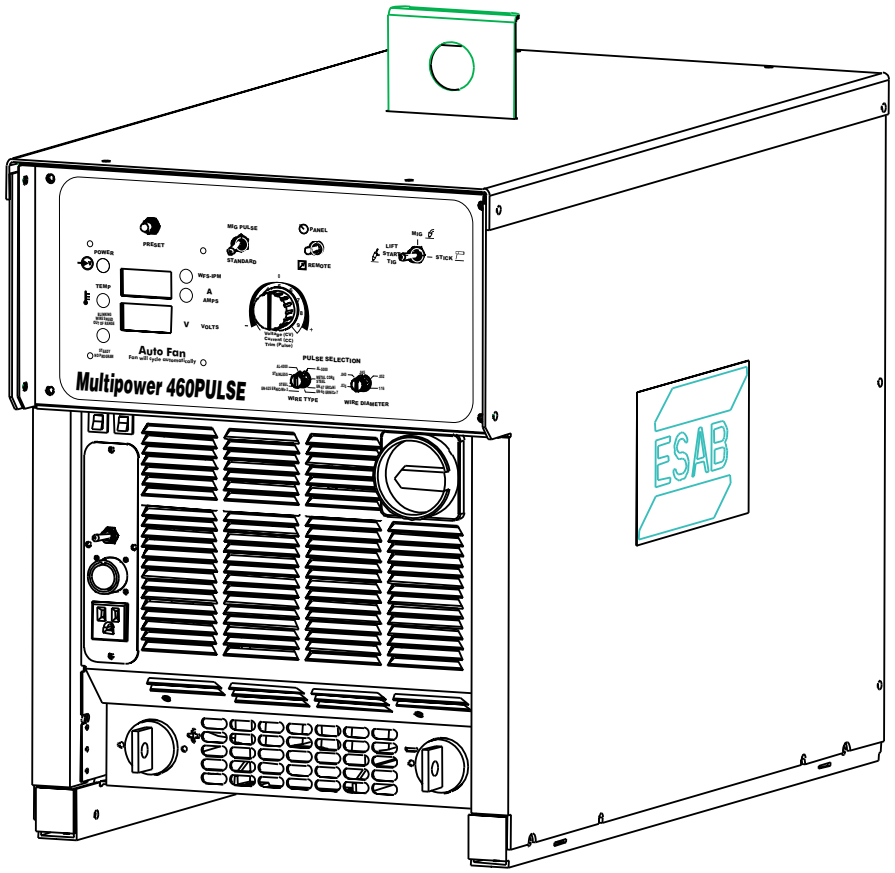
MultiPower 460 Pulse

DC Welding Power Source (Shipyard Model)



INSTRUCTION MANUAL

ESAB ITEM NO. 0558004922, MultiPower 460 Pulse - (208)230/460 vac, 3 ph., 60 Hz, Serial Number: MxxJ432xxx

0558004964 **10/2005**

BE SURE THIS INFORMATION REACHES THE OPERATOR.
YOU CAN GET EXTRA COPIES THROUGH YOUR SUPPLIER.

CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.

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1.0 Safety Precautions

WARNING: These Safety Precautions are for your protection. They summarize precautionary information from the references listed in Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.

PROTECT YOURSELF AND OTHERS -- Some welding, cutting, and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation and can injure skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:

1. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, and goggles are also required.
2. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
3. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
4. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
5. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains.
6. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.

1.1 Safety - English

FIRES AND EXPLOSIONS -- Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions. Therefore:

1. Remove all combustible materials well away from the work area or cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal."
3. Do not weld, cut or perform other hot work until the workpiece has been completely cleaned so that there are no substances on the workpiece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
7. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

ELECTRICAL SHOCK -- Contact with live electrical parts and ground can cause severe injury or death. DO NOT use AC welding current in damp areas, if movement is confined, or if there is danger of falling.

1. Be sure the power source frame (chassis) is connected to the ground system of the input power.

2. Connect the workpiece to a good electrical ground.

3. Connect the work cable to the workpiece. A poor or missing connection can expose you or others to a fatal shock.

4. Use well-maintained equipment. Replace worn or damaged cables.

5. Keep everything dry, including clothing, work area, cables, torch/electrode holder, and power source.

6. Make sure that all parts of your body are insulated from work and from ground.

7. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.

8. Put on dry, hole-free gloves before turning on the power.

9. Turn off the power before removing your gloves.

10. Refer to ANSI/ASC Standard Z49.1 (listed on next page) for specific grounding recommendations. Do not mistake the work lead for a ground cable.

ELECTRIC AND MAGNETIC FIELDS — May be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:

1. Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.

2. Exposure to EMF may have other health effects which are unknown.

3. Welders should use the following procedures to minimize exposure to EMF:

   A. Route the electrode and work cables together. Secure them with tape when possible.

   B. Never coil the torch or work cable around your body.

   C. Do not place your body between the torch and work cables. Route cables on the same side of your body.

   D. Connect the work cable to the workpiece as close as possible to the area being welded.

   E. Keep welding power source and cables as far away from your body as possible.

FUMES AND GASES -- Fumes and gases, can cause discomfort or harm, particularly in confined spaces. Do not breathe fumes and gases. Shielding gases can cause asphyxiation. Therefore:

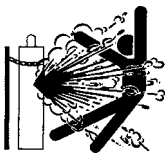
1. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.

2. Do not operate near degreasing and spraying operations. The heat or arc rays can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas, and other irritant gases.

3. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.

4. Refer to ANSI/ASC Standard Z49.1 (see listing below) for specific ventilation recommendations.

5. WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code §25249.5 et seq.)



CYLINDER HANDLING -- Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder, valve, or relief device can injure or kill. Therefore:

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.

2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.

3. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.

4. Locate cylinders away from heat, sparks, and flames. Never strike an arc on a cylinder.

5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

EQUIPMENT MAINTENANCE -- Faulty or improperly maintained equipment can cause injury or death. Therefore:

1. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.

2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.

3. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.

4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.

5. Keep all safety devices and cabinet covers in position and in good repair.

6. Use equipment only for its intended purpose. Do not modify it in any manner.

ADDITIONAL SAFETY INFORMATION -- For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"

2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"

3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"

4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"

5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding“

6. AWS C5.6 - "Recommended Practices for Gas Metal Arc Welding"“

7. AWS SP - "Safe Practices" - Reprint, Welding Handbook.

8. ANSI/AWS F4.1, "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances."

MEANING OF SYMBOLS - As used throughout this manual: Means Attention! Be Alert! Your safety is involved.

Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.

Means potential hazards which could result in personal injury or loss of life.

Means hazards which could result in minor personal injury.

1.2 Safety - Spanish

ADVERTENCIA: Estas Precauciones de Seguridad son para su protección. Ellas hacen resumen de información proveniente de las referencias listadas en la sección "Información Adicional Sobre La Seguridad". Antes de hacer cualquier instalación o procedimiento de operación , asegúrese de leer y seguir las precauciones de seguridad listadas a continuación así como también todo manual, hoja de datos de seguridad del material, calcomanias, etc. El no observar las Precauciones de Seguridad puede resultar en daño a la persona o muerte.

PROTEJASE USTED Y A LOS DEMAS-- Algunos procesos de soldadura, corte y ranurado son ruidosos y requiren protección para los oídos. El arco, como el sol , emite rayos ultravioleta (UV) y otras radiaciones que pueden dañar la piel y los ojos. El metal caliente causa quemaduras. EL entrenamiento en el uso propio de los equipos y sus procesos es esencial para prevenir accidentes. Por lo tanto:

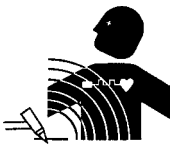
1. Utilice gafas de seguridad con protección a los lados siempre que esté en el área de trabajo, aún cuando esté usando careta de soldar, protector para su cara u otro tipo de protección.
2. Use una careta que tenga el filtro correcto y lente para proteger sus ojos, cara, cuello, y oídos de las chispas y rayos del arco cuando se esté operando y observando las operaciones. Alerte a todas las personas cercanas de no mirar el arco y no exponerse a los rayos del arco eléctrico o el metal fundido.
3. Use guantes de cuero a prueba de fuego, camisa pesada de mangas largas, pantalón de ruedo liso, zapato alto al tobillo, y careta de soldar con capucha para el pelo, para proteger el cuerpo de los rayos y chispas calientes provenientes del metal fundido. En ocaciones un delantal a prueba de fuego es necesario para protegerse del calor radiado y las chispas.
4. Chispas y partículas de metal caliente puede alojarse en las mangas enrolladas de la camisa , el ruedo del pantalón o los bolsillos. Mangas y cuellos deberán mantenerse abotonados, bolsillos al frente de la camisa deberán ser cerrados o eliminados.
5. Proteja a otras personas de los rayos del arco y chispas calientes con una cortina adecuada no-flamable como división.
6. Use careta protectora además de sus gafas de seguridad cuando esté removiendo escoria o puliendo. La escoria puede estar caliente y desprenderse con velocidad. Personas cercanas deberán usar gafas de seguridad y careta protectora.

FUEGO Y EXPLOSIONES -- El calor de las flamas y el arco pueden ocacionar fuegos. Escoria caliente y las chispas pueden causar fuegos y explosiones. Por lo tanto:

1. Remueva todo material combustible lejos del área de trabajo o cubra los materiales con una cobija a prueba de fuego. Materiales combustibles incluyen madera, ropa, líquidos y gases flamables, solventes, pinturas, papel, etc.
2. Chispas y partículas de metal pueden introducirse en las grietas y agujeros de pisos y paredes causando fuegos escondidos en otros niveles o espacios. Asegúrese de que toda grieta y agujero esté cubierto para proteger lugares adyacentes contra fuegos.
3. No corte, suelde o haga cualquier otro trabajo relacionado hasta que la pieza de trabajo esté totalmente limpia y libre de substancias que puedan producir gases inflamables o vapores tóxicos. No trabaje dentro o fuera de contenedores o tanques cerrados. Estos pueden explotar si contienen vapores inflamables.
4. Tenga siempre a la mano equipo extintor de fuego para uso instantáneo, como por ejemplo una manguera con agua, cubeta con agua, cubeta con arena, o extintor portátil. Asegúrese que usted esta entrenado para su uso.
5. No use el equipo fuera de su rango de operación. Por ejemplo, el calor causado por cable sobrecarga en los cables de soldar pueden ocasionar un fuego.
6. Después de termirar la operación del equipo, inspeccione el área de trabajo para cerciorarse de que las chispas o metal caliente ocasionen un fuego más tarde. Tenga personal asignado para vigilar si es necesario.
7. Para información adicional , haga referencia a la publicación NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", disponible a través de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

CHOQUE ELECTRICO -- El contacto con las partes eléctricas energizadas y tierra puede causar daño severo o muerte. NO use soldadura de corriente alterna (AC) en áreas húmedas, de movimiento confinado en lugares estrechos o si hay posibilidad de caer al suelo.

1. Asegúrese de que el chasis de la fuente de poder esté conectado a tierra através del sistema de electricidad primario.
2. Conecte la pieza de trabajo a un buen sistema de tierra física.
3. Conecte el cable de retorno a la pieza de trabajo. Cables y conductores expuestos o con malas conexiones pueden exponer al operador u otras personas a un choque eléctrico fatal.
4. Use el equipo solamente si está en buenas condiciones. Reemplaze cables rotos, dañados o con conductores expuestos.
5. Mantenga todo seco, incluyendo su ropa, el área de trabajo, los cables, antorchas, pinza del electrodo, y la fuente de poder.
6. Asegúrese que todas las partes de su cuerpo están insuladas de ambos, la pieza de trabajo y tierra.
7. No se pare directamente sobre metal o tierra mientras trabaja en lugares estrechos o áreas húmedas; trabaje sobre un pedazo de madera seco o una plataforma insulada y use zapatos con suela de goma.
8. Use guantes secos y sin agujeros antes de energizar el equipo.
9. Apage el equipo antes de quitarse sus guantes.
10. Use como referencia la publicación ANSI/ASC Standard Z49.1 (listado en la próxima página) para recomendaciones específicas de como conectar el equipo a tierra. No confunda el cable de soldar a la pieza de trabajo con el cable a tierra.



CAMPOS ELECTRICOS Y MAGNETICOS - Son peligrosos. La corriente eléctrica fluye através de cualquier conductor causando a nivel local Campos Eléctricos y Magnéticos (EMF). Las corrientes en el área de corte y soldadura, crean EMF alrrededor de los cables de soldar y las maquinas. Por lo tanto:

1. Soldadores u Operadores que use marca-pasos para el corazón deberán consultar a su médico antes de soldar. El Campo Electromagnético (EMF) puede interferir con algunos marca-pasos.

2. Exponerse a campos electromagnéticos (EMF) puede causar otros efectos de salud aún desconocidos.

3. Los soldadores deberán usar los siguientes procedimientos para minimizar exponerse al EMF:

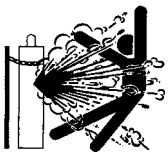
   A. Mantenga el electrodo y el cable a la pieza de trabajo juntos, hasta llegar a la pieza que usted quiere soldar. Asegúrelos uno junto al otro con cinta adhesiva cuando sea posible.
   B. Nunca envuelva los cables de soldar alrededor de su cuerpo.
   C. Nunca ubique su cuerpo entre la antorcha y el cable, a la pieza de trabajo. Mantega los cables a un sólo lado de su cuerpo.
   D. Conecte el cable de trabajo a la pieza de trabajo lo más cercano posible al área de la soldadura.
   E. Mantenga la fuente de poder y los cables de soldar lo más lejos posible de su cuerpo.

HUMO Y GASES -- El humo y los gases, pueden causar malestar o daño, particularmente en espacios sin ventilación. No inhale el humo o gases. El gas de protección puede causar falta de oxígeno.

Por lo tanto:

1. Siempre provea ventilación adecuada en el área de trabajo por medio natural o mecánico. No solde, corte, o ranure materiales con hierro galvanizado, acero inoxidable, cobre, zinc, plomo, berílio, o cadmio a menos que provea ventilación mecánica positiva . No respire los gases producidos por estos materiales.
2. No opere cerca de lugares donde se aplique substancias químicas en aerosol. El calor de los rayos del arco pueden reaccionar con los vapores de hidrocarburo clorinado para formar un fosfógeno, o gas tóxico, y otros irritant es.
3. Si momentáneamente desarrolla inrritación de ojos, nariz o garganta mientras est á operando, es indicación de que la ventilación no es apropiada. Pare de trabajar y tome las medidas necesarias para mejorar la ventilación en el área de trabajo. No continúe operando si el malestar físico persiste.
4. Haga referencia a la publicación ANSI/ASC Standard Z49.1 (Vea la lista a continuación) para recomendaciones específicas en la ventilación.

5. ADVERTENCIA-- Este producto cuando se utiliza para soldaduras o cortes, produce humos o gases, los cuales contienen químicos conocidos por el Estado de California de causar defectos en el nacimiento, o en algunos casos, Cancer. (California Health & Safety Code §25249.5 et seq.)



MANEJO DE CILINDROS-- Los cilindros, si no son manejados correctamente, pueden romperse y liberar violentamente gases. Rotura repentina del cilindro, válvula, o válvula de escape puede causar daño o muerte. Por lo tanto:

1. Utilize el gas apropiado para el proceso y utilize un regulador diseñado para operar y reducir la presión del cilindro de gas . No utilice adaptadores. Mantenga las mangueras y las conexiones en buenas condiciones. Observe las instrucciones de operación del manufacturero para montar el regulador en el cilindro de gas comprimido.

2. Asegure siempre los cilindros en posición vertical y amárrelos con una correa o cadena adecuada para asegurar el cilindro al carro, transportes, tablilleros, paredes, postes, o armazón. Nunca asegure los cilindros a la mesa de trabajo o las piezas que son parte del circuito de soldadura . Este puede ser parte del circuito elélectrico.

3. Cuando el cilindro no está en uso, mantenga la válvula del cilindro cerrada. Ponga el capote de protección sobre la válvula si el regulador no está conectado. Asegure y mueva los cilindros utilizando un carro o transporte adecuado. Evite el manejo brusco de los

MANTENIMIENTO DEL EQUIPO -- Equipo defectuoso o mal mantenido puede causar daño o muerte. Por lo tanto:

1. Siempre tenga personal cualificado para efectuar l a instalación, diagnóstico, y mantenimiento del equipo. No ejecute ningún trabajo eléctrico a menos que usted esté cualificado para hacer el trabajo.
2. Antes de dar mantenimiento en el interior de la fuente de poder, desconecte la fuente de poder del suministro de electricidad primaria.
3. Mantenga los cables, cable a tierra, conexciones, cable primario, y cualquier otra fuente de poder en buen estado operacional. No opere ningún equipo en malas condiciones.
4. No abuse del equipo y sus accesorios. Mantenga el equipo lejos de cosas que generen calor como hornos, también lugares húmedos como charcos de agua , aceite o grasa, atmósferas corrosivas y las inclemencias del tiempo.
5. Mantenga todos los artículos de seguridad y coverturas del equipo en su posición y en buenas condiciones.
6. Use el equipo sólo para el propósito que fue diseñado. No modifique el equipo en ninguna manera.

INFORMACION ADICIONAL DE SEGURIDAD -- Para más información sobre las prácticas de seguridad de los equipos de arco eléctrico para soldar y cortar, pregunte a su suplidor por una copia de "Precautions and Safe Practices for Arc Welding, Cutting and Gouging-Form 52-529.

Las siguientes publicaciones, disponibles através de la American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, son recomendadas para usted:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"

2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"

3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"

4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"

SIGNIFICADO DE LOS SIMBOLOS -- Según usted avanza en la lectura de este folleto: Los Símbolos Significan ¡Atención! ¡Esté Alerta! Se trata de su seguridad.

Significa riesgo inmediato que, de no ser evadido, puede resultar inmediatamente en serio daño personal o la muerte.

Significa el riesgo de un peligro potencial que puede resultar en serio daño personal o la muerte.

Significa el posible riesgo que puede resultar en menores daños a la persona.

1.3 Safety - French

AVERTISSEMENT : Ces règles de sécurité ont pour but d'assurer votre protection. Ils récapitulent les informations de précaution provenant des références dans la section des Informations de sécurité supplémentaires. Avant de procéder à l'installation ou d'utiliser l'unité, assurez-vous de lire et de suivre les précautions de sécurité ci-dessous, dans les manuels, les fiches d'information sur la sécurité du matériel et sur les étiquettes, etc. Tout défaut d'observer ces précautions de sécurité peut entraîner des blessures graves ou mortelles.

PROTÉGEZ-VOUS -- Les processus de soudage, de coupage et de gougeage produisent un niveau de bruit élevé et exige l'emploi d'une protection auditive. L'arc, tout comme le soleil, émet des rayons ultraviolets en plus d'autre rayons qui peuvent causer des blessures à la peau et les yeux. Le métal incandescent peut causer des brûlures. Une formation reliée à l'usage des processus et de l'équipement est essentielle pour prévenir les accidents. Par conséquent:

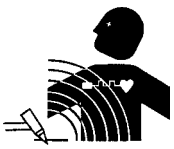
1. Portez des lunettes protectrices munies d'écrans latéraux lorsque vous êtes dans l'aire de travail, même si vous devez porter un casque de soudeur, un écran facial ou des lunettes étanches.
2. Portez un écran facial muni de verres filtrants et de plaques protectrices appropriées afin de protéger vos yeux, votre visage, votre cou et vos oreilles des étincelles et des rayons de l'arc lors d'une opération ou lorsque vous observez une opération. Avertissez les personnes se trouvant à proximité de ne pas regarder l'arc et de ne pas s'exposer aux rayons de l'arc électrique ou le métal incandescent.
3. Portez des gants ignifugiés à crispin, une chemise épaisse à manches longues, des pantalons sans rebord et des chaussures montantes afin de vous protéger des rayons de l'arc, des étincelles et du métal incandescent, en plus d'un casque de soudeur ou casquette pour protéger vos cheveux. Il est également recommandé de porter un tablier ininflammable afin de vous protéger des étincelles et de la chaleur par rayonnement.
4. Les étincelles et les projections de métal incandescent risquent de se loger dans les manches retroussées, les rebords de pantalons ou les poches. Il est recommandé de garder boutonnés le col et les manches et de porter des vêtements sans poches en avant.
5. Protégez toute personne se trouvant à proximité des étincelles et des rayons de l'arc à l'aide d'un rideau ou d'une cloison ininflammable.
6. Portez des lunettes étanches par dessus vos lunettes de sécurité lors des opérations d'écaillage ou de meulage du laitier. Les écailles de laitier incandescent peuvent être projetées à des distances considérables. Les personnes se trouvant à proximité doivent également porter des lunettes étanches par dessus leur lunettes de sécurité.

INCENDIES ET EXPLOSIONS -- La chaleur provenant des flammes ou de l'arc peut provoquer un incendie. Le laitier incandescent ou les étincelles peuvent également provoquer un incendie ou une explosion. Par conséquent :

1. Éloignez suffisamment tous les matériaux combustibles de l'aire de travail et recouvrez les matériaux avec un revêtement protecteur ininflammable. Les matériaux combustibles incluent le bois, les vêtements, la sciure, le gaz et les liquides combustibles, les solvants, les peintures et les revêtements, le papier, etc.
2. Les étincelles et les projections de métal incandescent peuvent tomber dans les fissures dans les planchers ou dans les ouvertures des murs et déclencher un incendie couvant à l'étage inférieur Assurez-vous que ces ouvertures sont bien protégées des étincelles et du métal incandescent.
3. N'exécutez pas de soudure, de coupe ou autre travail à chaud avant d'avoir complètement nettoyé la surface de la pièce à traiter de façon à ce qu'il n'ait aucune substance présente qui pourrait produire des vapeurs inflammables ou toxiques. N'exécutez pas de travail à chaud sur des contenants fermés car ces derniers pourraient exploser.
4. Assurez-vous qu'un équipement d'extinction d'incendie est disponible et prêt à servir, tel qu'un tuyau d'arrosage, un seau d'eau, un seau de sable ou un extincteur portatif. Assurez-vous d'être bien instruit par rapport à l'usage de cet équipement.
5. Assurez-vous de ne pas excéder la capacité de l'équipement. Par exemple, un câble de soudage surchargé peut surchauffer et provoquer un incendie.
6. Une fois les opérations terminées, inspectez l'aire de travail pour assurer qu'aucune étincelle ou projection de métal incandescent ne risque de provoquer un incendie ultérieurement. Employez des guetteurs d'incendie au besoin.
7. Pour obtenir des informations supplémentaires, consultez le NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", disponible au National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

CHOC ÉLECTRIQUE -- Le contact avec des pièces électriques ou les pièces de mise à la terre sous tension peut causer des blessures graves ou mortelles. NE PAS utiliser un courant de soudage c.a. dans un endroit humide, en espace restreint ou si un danger de chute se pose.

1. Assurez-vous que le châssis de la source d'alimentation est branché au système de mise à la terre de l'alimentation d'entrée.
2. Branchez la pièce à traiter à une bonne mise de terre électrique.
3. Branchez le câble de masse à la pièce à traiter et assurez une bonne connexion afin d'éviter le risque de choc électrique mortel.
4. Utilisez toujours un équipement correctement entretenu. Remplacez les câbles usés ou endommagés.
5. Veillez à garder votre environnement sec, incluant les vêtements, l'aire de travail, les câbles, le porte-électrode/torche et la source d'alimentation.
6. Assurez-vous que tout votre corps est bien isolé de la pièce à traiter et des pièces de la mise à la terre.
7. Si vous devez effectuer votre travail dans un espace restreint ou humide, ne tenez vous pas directement sur le métal ou sur la terre; tenez-vous sur des planches sèches ou une plate-forme isolée et portez des chaussures à semelles de caoutchouc.
8. Avant de mettre l'équipement sous tension, isolez vos mains avec des gants secs et sans trous.
9. Mettez l'équipement hors tension avant d'enlever vos gants.
10. Consultez ANSI/ASC Standard Z49.1 (listé à la page suivante) pour des recommandations spécifiques concernant les procédures de mise à la terre. Ne pas confondre le câble de masse avec le câble de mise à la terre.



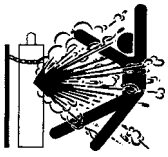
CHAMPS ÉLECTRIQUES ET MAGNÉTIQUES — comportent un risque de danger. Le courant électrique qui passe dans n'importe quel conducteur produit des champs électriques et magnétiques localisés. Le soudage et le courant de coupage créent des champs électriques et magnétiques autour des câbles de soudage et l'équipement. Par conséquent :

1. Un soudeur ayant un stimulateur cardiaque doit consulter son médecin avant d'entreprendre une opération de soudage. Les champs électriques et magnétiques peuvent causer des ennuis pour certains stimulateurs cardiaques.
2. L'exposition à des champs électriques et magnétiques peut avoir des effets néfastes inconnus pour la santé.
3. Les soudeurs doivent suivre les procédures suivantes pour minimiser l'exposition aux champs électriques et magnétiques :
   A. Acheminez l'électrode et les câbles de masse ensemble. Fixez-les à l'aide d'une bande adhésive lorsque possible.
   B. Ne jamais enrouler la torche ou le câble de masse autour de votre corps.
   C. Ne jamais vous placer entre la torche et les câbles de masse. Acheminez tous les câbles sur le même côté de votre corps.
   D. Branchez le câble de masse à la pièce à traiter le plus près possible de la section à souder.
   E. Veillez à garder la source d'alimentation pour le soudage et les câbles à une distance appropriée de votre corps.

LES VAPEURS ET LES GAZ -- peuvent causer un malaise ou des dommages corporels, plus particulièrement dans les espaces restreints. Ne respirez pas les vapeurs et les gaz. Le gaz de protection risque de causer l'asphyxie. Par conséquent :

1. Assurez en permanence une ventilation adéquate dans l'aire de travail en maintenant une ventilation naturelle ou à l'aide de moyens mécanique. N'effectuez jamais de travaux de soudage, de coupage ou de gougeage sur des matériaux tels que l'acier galvanisé, l'acier inoxydable, le cuivre, le zinc, le plomb, le berylliym ou le cadmium en l'absence de moyens mécaniques de ventilation efficaces. Ne respirez pas les vapeurs de ces matériaux.
2. N'effectuez jamais de travaux à proximité d'une opération de dégraissage ou de pulvérisation. Lorsque la chaleur
   ou le rayonnement de l'arc entre en contact avec les vapeurs d'hydrocarbure chloré, ceci peut déclencher la formation de phosgène ou d'autres gaz irritants, tous extrêmement toxiques.
3. Une irritation momentanée des yeux, du nez ou de la gorge au cours d'une opération indique que la ventilation n'est pas adéquate. Cessez votre travail afin de prendre les mesures nécessaires pour améliorer la ventilation dans l'aire de travail. Ne poursuivez pas l'opération si le malaise persiste.
4. Consultez ANSI/ASC Standard Z49.1 (à la page suivante) pour des recommandations spécifiques concernant la ventilation.

5. AVERTISSEMENT : Ce produit, lorsqu'il est utilisé dans une opération de soudage ou de coupage, dégage des vapeurs ou des gaz contenant des chimiques considéres par l'état de la Californie comme étant une cause des malformations congénitales et dans certains cas, du cancer. (California Health & Safety Code §25249.5 et seq.)



MANIPULATION DES CYLINDRES -- La manipulation d'un cylindre, sans observer les précautions nécessaires, peut produire des fissures et un échappement dangereux des gaz. Une brisure soudaine du cylindre, de la soupape ou du dispositif de surpression peut causer des blessures graves ou mortelles. Par conséquent :

1. Utilisez toujours le gaz prévu pour une opération et le détendeur approprié conçu pour utilisation sur les cylindres de gaz comprimé. N'utilisez jamais d'adaptateur. Maintenez en bon état les tuyaux et les raccords. Observez les instructions d'opération du fabricant pour assembler le détendeur sur un cylindre de gaz comprimé.
2. Fixez les cylindres dans une position verticale, à l'aide d'une chaîne ou une sangle, sur un chariot manuel, un châssis de roulement, un banc, un mur, une colonne ou un support convenable. Ne fixez jamais un cylindre à un poste de travail ou toute autre dispositif faisant partie d'un circuit électrique.
3. Lorsque les cylindres ne servent pas, gardez les soupapes fermées. Si le détendeur n'est pas branché, assurez-vous que le bouchon de protection de la soupape est bien en place. Fixez et déplacez les cylindres à l'aide d'un chariot manuel approprié. Toujours manipuler les cylindres avec soin.
4. Placez les cylindres à une distance appropriée de toute source de chaleur, des étincelles et des flammes. Ne jamais amorcer l'arc sur un cylindre.
5. Pour de l'information supplémentaire, consultez CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", mis à votre disposition par le Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

ENTRETIEN DE L'ÉQUIPEMENT -- Un équipement entretenu de façon défectueuse ou inadéquate peut causer des blessures graves ou mortelles. Par conséquent :

1. Efforcez-vous de toujours confier les tâches d'installation, de dépannage et d'entretien à un personnel qualifié. N'effectuez aucune réparation électrique à moins d'être qualifié à cet effet.
2. Avant de procéder à une tâche d'entretien à l'intérieur de la source d'alimentation, débranchez l'alimentation électrique.
3. Maintenez les câbles, les fils de mise à la terre, les branchements, le cordon d'alimentation et la source d'alimentation en bon état. N'utilisez jamais un équipement s'il présente une défectuosité quelconque.
4. N'utilisez pas l'équipement de façon abusive. Gardez l'équipement à l'écart de toute source de chaleur, notamment des fours, de l'humidité, des flaques d'eau, de l'huile ou de la graisse, des atmosphères corrosives et des intempéries.
5. Laissez en place tous les dispositifs de sécurité et tous les panneaux de la console et maintenez-les en bon état.
6. Utilisez l'équipement conformément à son usage prévu et n'effectuez aucune modification.

INFORMATIONS SUPPLÉMENTAIRES RELATIVES À LA SÉCURITÉ -- Pour obtenir de l'information supplémentaire sur les règles de sécurité à observer pour l'équipement de soudage à l'arc électrique et le coupage, demandez un exemplaire du livret "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

Les publications suivantes sont également recommandées et mises à votre disposition par l'American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126 :

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"

SIGNIFICATION DES SYMBOLES

Ce symbole, utilisé partout dans ce manuel, signifie "Attention" ! Soyez vigilant ! Votre sécurité est en jeu.

Signifie un danger immédiat. La situation peut entraîner des blessures graves ou mortelles.

Signifie un danger potentiel qui peut entraîner des blessures graves ou mortelles.

Signifie un danger qui peut entraîner des blessures corporelles mineures.

2.0. Description

This manual has been prepared for use by an experienced operator. It provides information to familiarize the operator with the design, installation and operation of the MultiPower 460 Pulse power source. DO NOT attempt to install or operate this equipment until you have read and fully understood these instructions. The information presented here should be given careful consideration to ensure proper installation and optimum weld performance of this equipment.

Table 2-1. Specifications for MultiPower 460 Pulse

OPEN CIRCUIT VOLTAGE (U_2)				**80 VDC Max.**	
RATED OUTPUT	**DUTY CYCLE**			**60%**	**100%**
	Current (I_2)			**500 A**	**450 A**
	Voltage (U_2)			**40 V**	**38 V**
RATED INPUT	**3 Phase**	**60 Hz**	**Volts(U_1)**	**Current (I_1) Flat**	**Current (I_1) Flat**
			208/230 V	**76 A**	**66 A**
			460 V	**38 A**	**33 A**
Power Factor at Rated Output			**89%**		
Welding Range			**10 A/12 V - 500 A/40 V**		
Auxiliary Power			**115 V ac @ 10 A, 60 Hz**		
PHYSICAL SPECIFICATIONS					
Height	**32.4" (82.3 cm)**				
Width	**18.8" (48.3 cm)**				
Depth	**34.5" (87.6 cm)**				
Net Weight	**322lbs (146 kg)**				
Shipping Weight	**375lbs (170 kg)**				

The MultiPower 460 Pulse is a multi-process power source designed for Mig short circuiting, spray and pulse spray transfer (GMAW), flux cored (FCAW), Tig (GTAW), and stick (SMAW) welding and air carbon arc cutting/gouging (CAC-A) applications. Table 2-1 outlines the electrical and physical specifications.

A. Power Source

The power source is a constant current (CC) and constant voltage (CV), three phase, secondary chopper dc design with solid state contactor and control circuitry. It provides the volt-ampere characteristics desired for conventional MIG and flux cored arc welding in the CV (constant voltage) mode or stick welding, Tig (GTAW) and arc gouging in the CC (constant current) mode.

Features

- Auto Fan - The MultiPower 460 Pulse fan will run when the power source is first powered up. It will continue running for 6 minutes and then shut down. The fan will start again when welding begins and is at a current level above 50 amps. The fan will remain running for 6 minutes after welding stops and then shut down automatically.

- Stainless steel frame for environmental durability.
- Durable composite side and top panels will not corrode.
- 100% duty cycle output at 450 amps.
- Designed for "Off the Arc" wire feeders.

B. Volt - Ampere Characteristics

The curves shown in Figure 2-1 represent the static volt-ampere characteristics for the power source. The slant of these curves is referred to as the "slope" and is generally defined as the voltage drop per 100 amperes of current use. These curves show the output voltage available at any given output current from the minimum to the maximum setting of the voltage/current control.

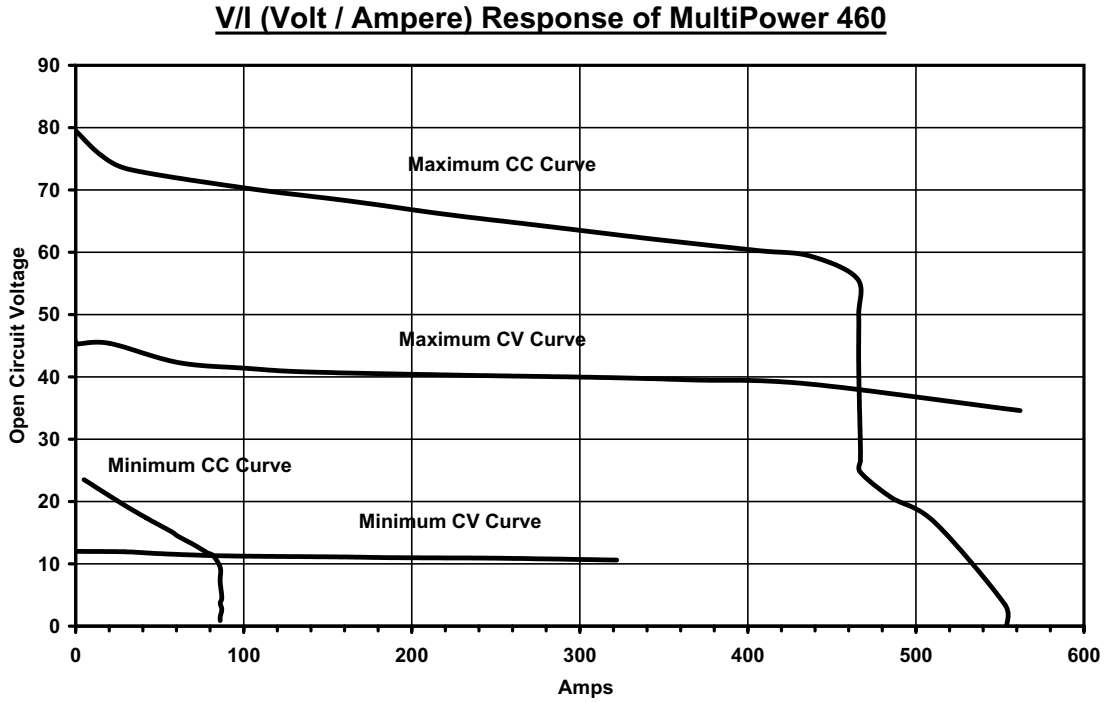


Figure 2-1. MultiPower 460 Volt-Ampere Curves

C. Control Panel Description (Refer To Figures 2-2 & 2-3)

1. Fault Lamp

The RED fault light on the MultiPower 460 Pulse front panel indicates a problem with set-up parameters. A "Steady-On" light indicates there is no program for the material and wire diameter selected. A "Blinking" light indicates the wire feed speed is out of the recommended range.

2. Temperature Lamp

The TEMP lamp illuminates if an over temperature condition occurs within the MultiPower 460 Pulse power source. This condition may be caused by excessive duty cycle or over-current conditions. When an over temperature condition occurs, the welding output is turned off and the unit must be allowed to cool. The machine will automatically reset when the temperature falls to a safe level.

3. Process Selector Switch

The three position process selector switch is located in the upper right-hand corner of the control panel. The process selector switch position provides the visual indication of which weld process (Mig, Tig or Stick) has been selected.

4. Digital Display/Meters (WFS, Amps & Volts)

The digital displays located on the left side of the control panel are multifunctional depending on the welding process being used. The top display reads wire feed speed in inches per minute during MIG PULSE preset and welding current (amps) during TIG and STICK preset. The bottom display reads power source open circuit voltage during STANDARD Mig preset. Each display indicates average welding current or average welding voltage, respectively, during welding.

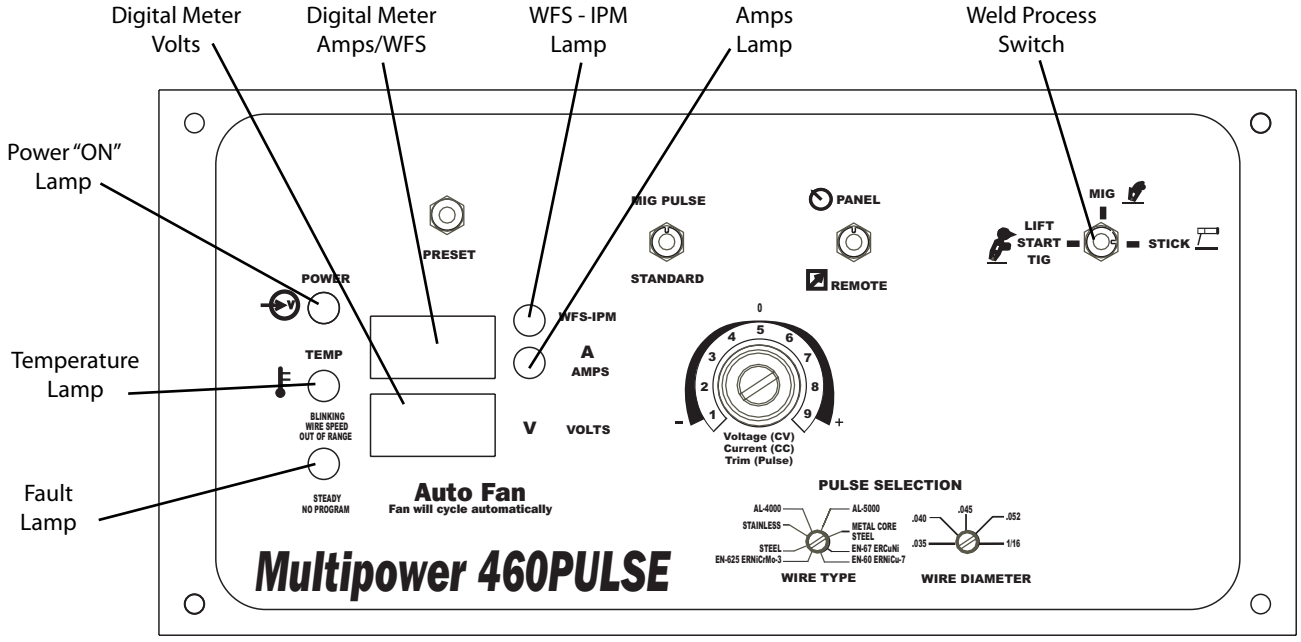


Figure 2-2. Control Panel

5. Voltage / Current / Trim

The Power Source Open Circuit Voltage is controlled with this knob when the WELD PROCESS selector switch is in the MIG position. The Mig open circuit voltage can be preset by pressing the PRESET button and reading the arc volts in the bottom digital display while rotating this knob.

The weld current is controlled with this knob when the WELD PROCESS SWITCH is in the TIG or STICK position. The welding current can be preset in amperes by pressing the PRESET button and reading the current (amps) in the top digital display while rotating this knob. The average weld current will be displayed during welding.

For MIG PULSE welding, the welding power to the electrode is trimmed by turning the knob clockwise to increase pulse power or counterclockwise to decrease pulse power.

6. Panel/Remote Switch

With this switch in the PANEL position, the output voltage in the CV mode and the output current in the CC mode is controlled by adjusting the VOLTAGE/CURRENT/TRIM knob on the power source control panel to the desired output. In the REMOTE position, output is controlled using a remote control device such as a hand or foot control.

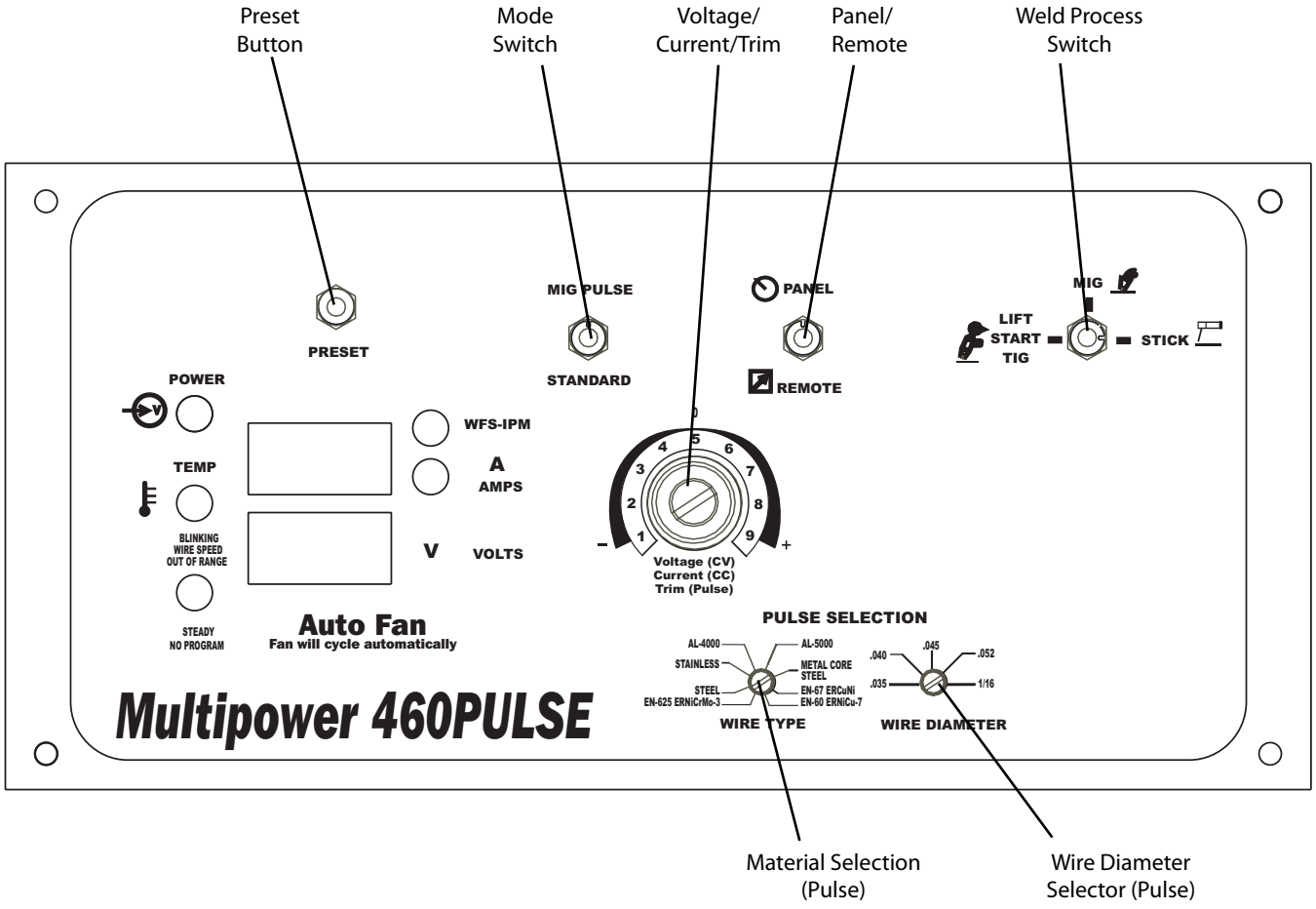


Figure 2-3. Control Panel

7. Preset Button

Preset push button is used in conjunction with the VOLTAGE/CURRENT/TRIM knob to set the desired voltage / current. Preset switch is also used in the Pulse Mig mode to preset the pulse parameters by using preset wire feed speed as the intial setting for the "Off the Arc" feeder.

8. Standard / MIG Pulse Switch

This switch enables the Mig pulse mode. When this switch is in the MIG PULSE position, the pulse parameters are determined by the WIRE TYPE and WIRE DIAMETER position on the PULSE SELECTION switches.

9. Pulse Selection Switches

WIRE TYPE
Use this switch to select the WIRE TYPE used by the wire feeder. The position of this switch and the WIRE DIAMETER switch selects the pulse parameters to be used during welding in the Mig pulse mode.

WIRE DIAMETER
Use this switch to select the WIRE DIAMETER being used. The position of this switch and the WIRE TYPE switch selects the pulse parameters during welding in the Mig pulse mode.

D. Power Source Front View Description (Refer To Figure 2-4)

1. Power On/off Switch & Lamp

The main power switch is located on the right front panel of the power source. This switch energizes the main transformer, control circuitry and illuminates the Power "ON" lamp.

2. Remote Control Receptacle

This receptacle (J8) is provided for an optional 14-pin control cable from the optional remote pendant, Tig torch control or foot control . This receptacle is operative only if the PANEL/REMOTE switch on the power source front panel is in the "REMOTE" position.

3. Contactor "On/Off" Switch

This switch provides manual control of the welding contactor when the PROCESS switch on the control panel is in the MIG position (CV welding). Turn to ON position when using an "Off the Arc" wire feeder with secondary contactor is being operated in the CV mode.

4. Auxiliary 115 Vac Receptacle

A 115 Vac receptacle is provided to supply power to accessories such as a water cooler, heated CO_2 regulator, or small hand tools. The receptacle is rated 115 Vac / 10 amps with a floating neutral.

5. 42 Vac (CB-2) & 115 Vac Circuit Breaker (CB-1)

These resettable 10 amp circuit breakers (CB-1 & CB-2) protect the 42 volt wire feeder/control and 115 volt auxiliary receptacle circuitry against over current. (Table 5-1 provides troubleshooting information).

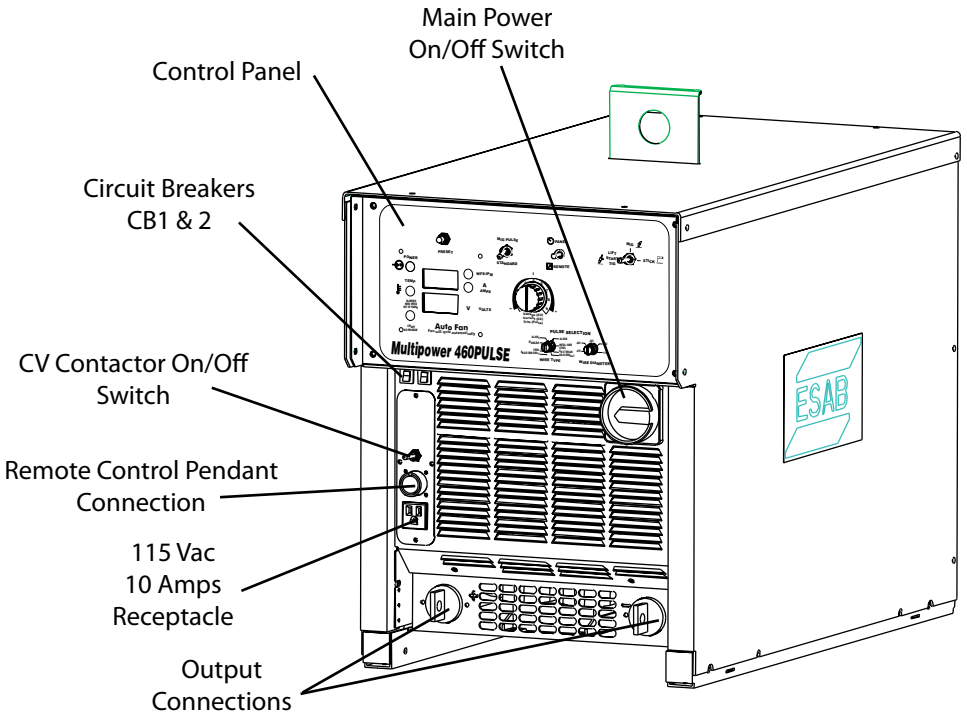


Figure 2-4. MultiPower 460

E. Optional Accessories

1. Remote Control Pendant (P/N - 0558002871)

This pendant (Figure 2-5) provides remote output control and a MIG contactor closure switch to close the contactor making the output terminals "hot". The PANEL/REMOTE switch on the MultiPower 460 Pulse control panel must be placed in the REMOTE position when using this accessory.

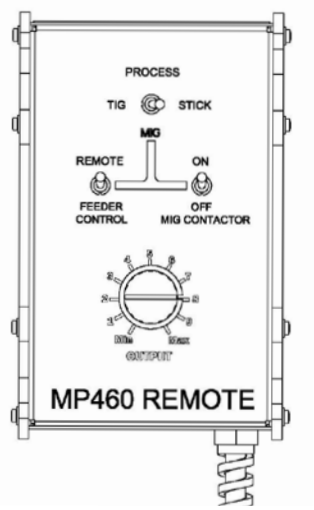


Figure 2-5. Remote Control Pendant

2. Remote Control Options

The options below (Figure 2-6) provide remote output control. The PANEL/REMOTE switch on the MultiPower 460 Pulse control panel must be placed in the REMOTE position when using these accessories.

FC-5B Foot Control - 30 ft. (9.1 m) ..... P/N 33646
FC-5B EHD Foot Control - 30 ft. (9.1 m)..... P/N 33841
TC-2B Torch Control - 25 ft. (7.6 m)..... P/N 33839
HC-3B Hand Control - 30 ft. (9.1 m) ..... P/N 33838

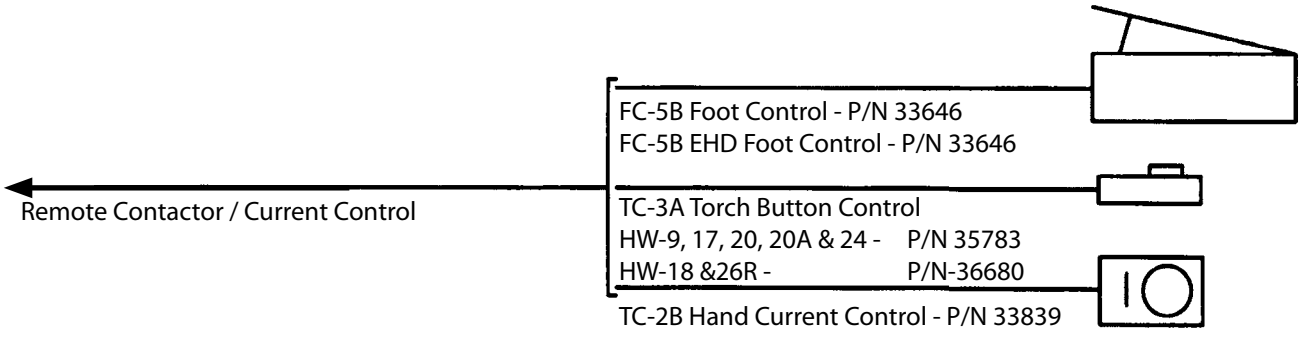

FC-5B Foot Control - P/N 33646
FC-5B EHD Foot Control - P/N 33646
Remote Contactor / Current Control
TC-3A Torch Button Control
HW-9, 17, 20, 20A & 24 - P/N 35783
HW-18 &26R - P/N-36680
TC-2B Hand Current Control - P/N 33839

Figure 2-6. Remote Control Options

3.0. Installation

A. Location

A proper installation site is necessary for the power source to provide dependable service. A proper installation site permits freedom of air movement through the unit while minimizing exposure to dust, dirt, moisture, and corrosive vapors. A minimum of 18 inches (46 cm) is required between the side and rear panels of the power source and the nearest obstruction.

The selected site should also allow easy removal of the power source outer enclosure for maintenance. See Table 2-1 for overall dimensions of the unit.

CAUTION **Do not use filters on this unit as they would restrict the volume of intake air required for proper cooling. Output ratings on this unit are based on an unobstructed supply of cooling air drawn over its internal components. Warranty is void if any type of filtering device is used.**

B. Receiving, Unpacking And Placement

When requesting information concerning this equipment, it is essential that Item number, Serial number and Model number of the equipment be supplied.

- Upon receipt, remove all packing material and carefully inspect for any damage that may have occurred during shipment. Any claims for loss or damage that may have occurred in transit must be filed by the purchaser with the carrier. A copy of the bill of lading and freight bill will be furnished by the carrier on request.
- Remove the power source from the container. Remove all packing materials. Check the container for any loose parts.
- Check air passages at front and rear of cabinet, making sure that packing material has not obstructed air flow through the power source.
- After selecting an installation site, place the power source in the desired location. The unit may be lifted either by using the lifting bail or by forklift truck. If a forklift is used for lifting the unit, be sure that the lift forks are long enough to extend completely under the base.

C. Primary (Input) Electrical Connection

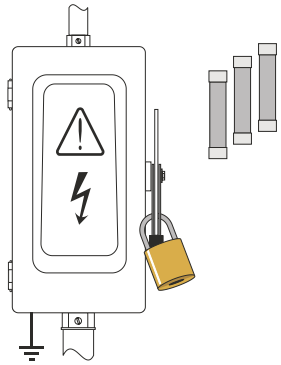
This power source is a three-phase unit and must be connected to a three-phase AC primary power. It is recommended that the unit be operated on a dedicated circuit to prevent impairment of weld performance due to an overloaded circuit.

Table 3-1. Recommended Sizes for Input Conductors and Line Fuses

Rated Input @ 100% Duty Cycle		Input & GND Conductor* CU/AWG	Fuse Size Amps
Volts	Amps		
220	68	No. 6	100
230	66	No. 6	100
400	37	No. 8	60
460	33	No. 8	60

*Sized per National Code for 80 °C rated copper conductors @ 30 °C ambient. Not more than three conductors in raceway or cable. Local codes should be followed if they specify sizes other than those listed above.

WARNING



ELECTRIC SHOCK CAN KILL! BEFORE MAKING ELECTRICAL INPUT CONNECTIONS TO THE POWER SOURCE, "MACHINERY LOCKOUT PROCEDURES" SHOULD BE EMPLOYED. IF THE CONNECTIONS ARE TO BE MADE FROM A LINE DISCONNECT SWITCH, PLACE THE SWITCH IN THE OFF POSITION AND PADLOCK IT TO PREVENT INADVERTENT TRIPPING. IF THE CONNECTION IS MADE FROM A FUSE BOX, REMOVE THE CORRESPONDING FUSES AND PADLOCK THE BOX COVER. IF IT IS NOT POSSIBLE TO USE PADLOCKS, ATTACH A RED TAG TO THE LINE DISCONNECT SWITCH (OR FUSE BOX) WARNING OTHERS THAT THE CIRCUIT IS BEING WORKED ON.

WARNING **THE CHASSIS MUST BE CONNECTED TO AN APPROVED ELECTRICAL GROUND. FAILURE TO DO SO MAY RESULT IN ELECTRICAL SHOCK, SEVERE BURNS OR DEATH.**

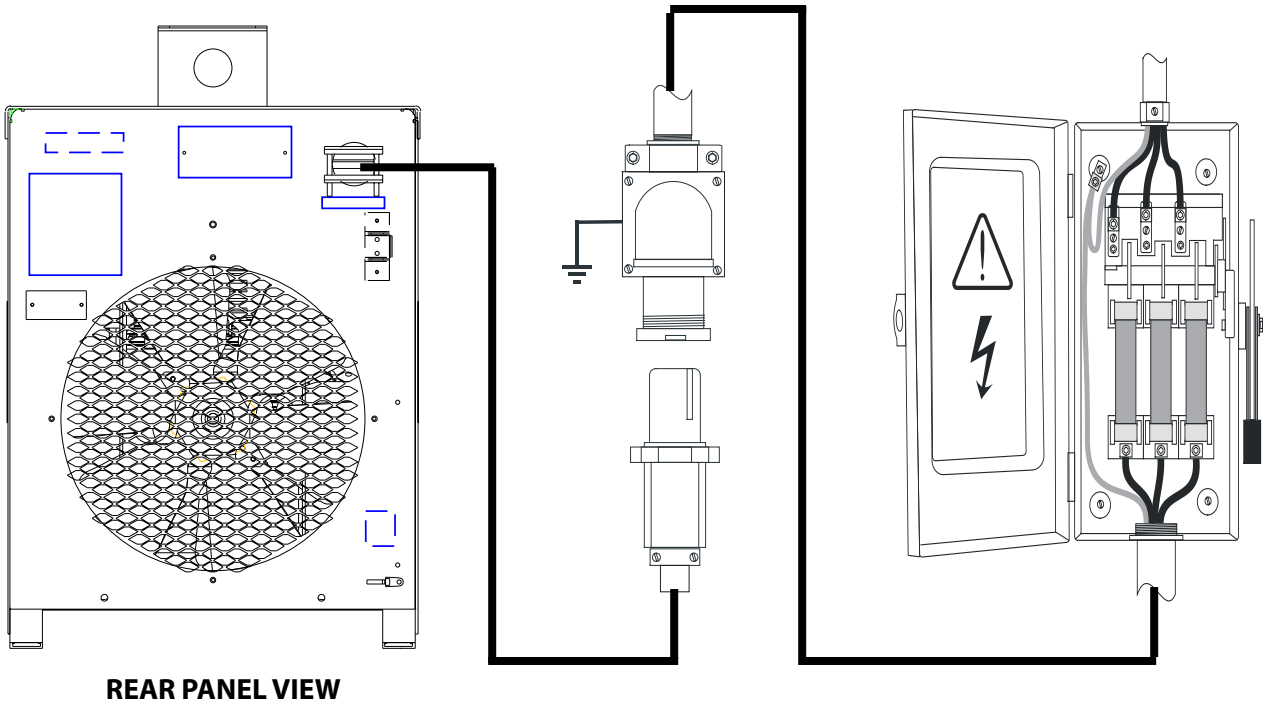


Figure 3-1. Typical Installation - User Supplied 3 Phase Fused Power Disconnect Box with Receptacle and Plug

1. The primary power leads must be insulated copper conductors. Three power leads and one ground wire are required. Either rubber covered cable or conduit (flexible or solid) may be used. Table 3-1 provides recommended input conductors and line fuse sizes.
2. Remove the top cover. Identify primary power input connection block, chassis ground lug, and primary input terminal board. Refer to Figures 3-3 and 3-4.
3. When using the provided strain relief, refer to Figure 3-2 for proper cable strip lengths. It is important to follow the cable strip guide to ensure that if the primary input cable is ever pulled from the strain relief, the input conductors will be pulled from the terminal block before the ground lead is pulled from the ground lug. Thread the input and ground conductors through the large strain-relief in the rear panel of the power source. Connect the ground wire to the terminal lug located on the "A" frame support. Connect the primary power leads to terminals L1, L2, and L3 on the input power block. Secure the strain relief on the input cable.
4. Check all connections for proper tightness. Ensure all connections are correct and well-insulated.

WARNING

ELECTRIC SHOCK CAN KILL! BEFORE MAKING ELECTRICAL INPUT CONNECTIONS TO THE POWER SOURCE, "MACHINERY LOCKOUT PROCEDURES" SHOULD BE EMPLOYED. IF THE CONNECTIONS ARE TO BE MADE FROM A LINE DISCONNECT SWITCH, PLACE THE SWITCH IN THE OFF POSITION AND PADLOCK IT TO PREVENT INADVERTENT TRIPPING. IF THE CONNECTION IS MADE FROM A FUSE BOX, REMOVE THE CORRESPONDING FUSES AND PADLOCK THE BOX COVER. IF IT IS NOT POSSIBLE TO USE PADLOCKS, ATTACH A RED TAG TO THE LINE DISCONNECT SWITCH (OR FUSE BOX) WARNING OTHERS THAT THE CIRCUIT IS BEING WORKED ON.

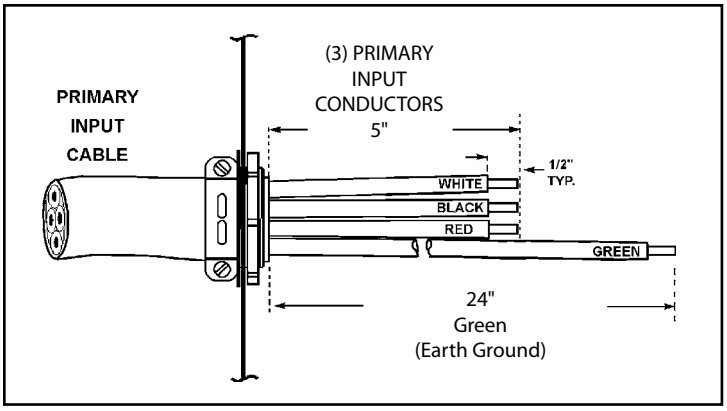


Figure 3-2. Recommended Cable Strip Lengths

WARNING

THE CHASSIS MUST BE CONNECTED TO AN APPROVED ELECTRICAL GROUND. FAILURE TO DO SO MAY RESULT IN ELECTRICAL SHOCK, SEVERE BURNS OR DEATH.

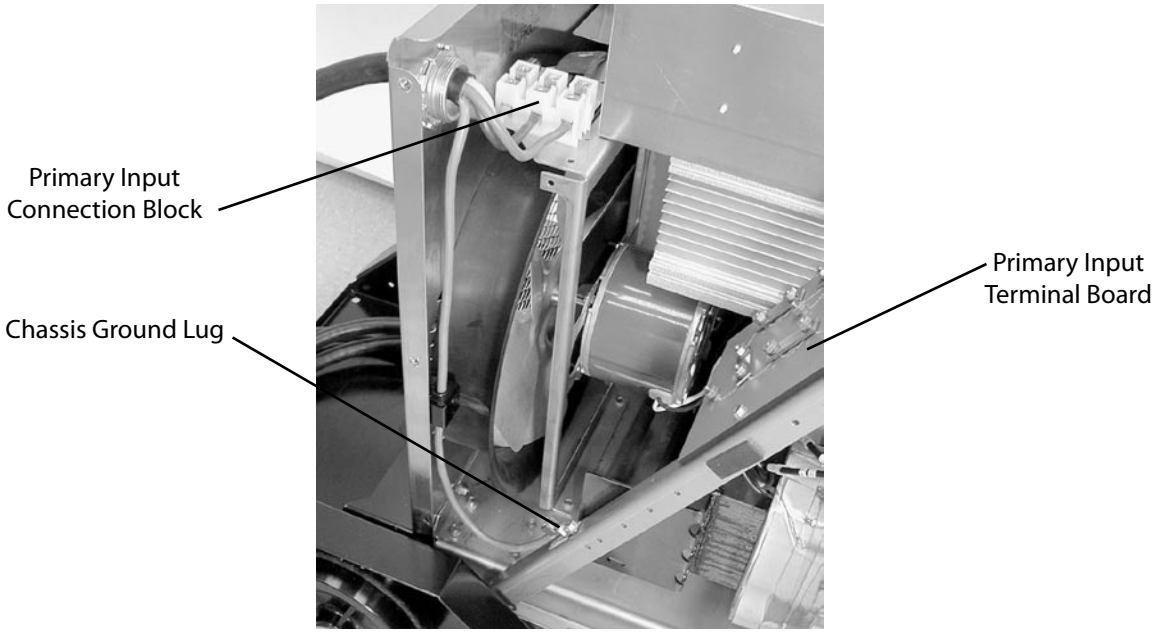


Figure 3-3. Primary Power Leads L1,L2, L3 & Ground

5. Figure 3-4 illustrates the input voltage terminal boards and the input voltage link connections. The particular voltages from which this power source may be operated are stated on the rating plate. The voltage links were factory set for highest voltage stated on the rating plate (460 VAC). If the power source is to be operated on another stated input voltage, the links must be reset for that particular input voltage. Always verify the input voltage and check the link arrangement regardless of factory setting. The voltage links are set up by reconfiguring the copper link bars to the silk-screened voltage designations for the desired voltage.

WARNING **CHECK THE VOLTAGE LINKS FOR PROPER VOLTAGE ON THE INPUT TERMINAL BOARD BEFORE APPLYING PRIMARY POWER.**

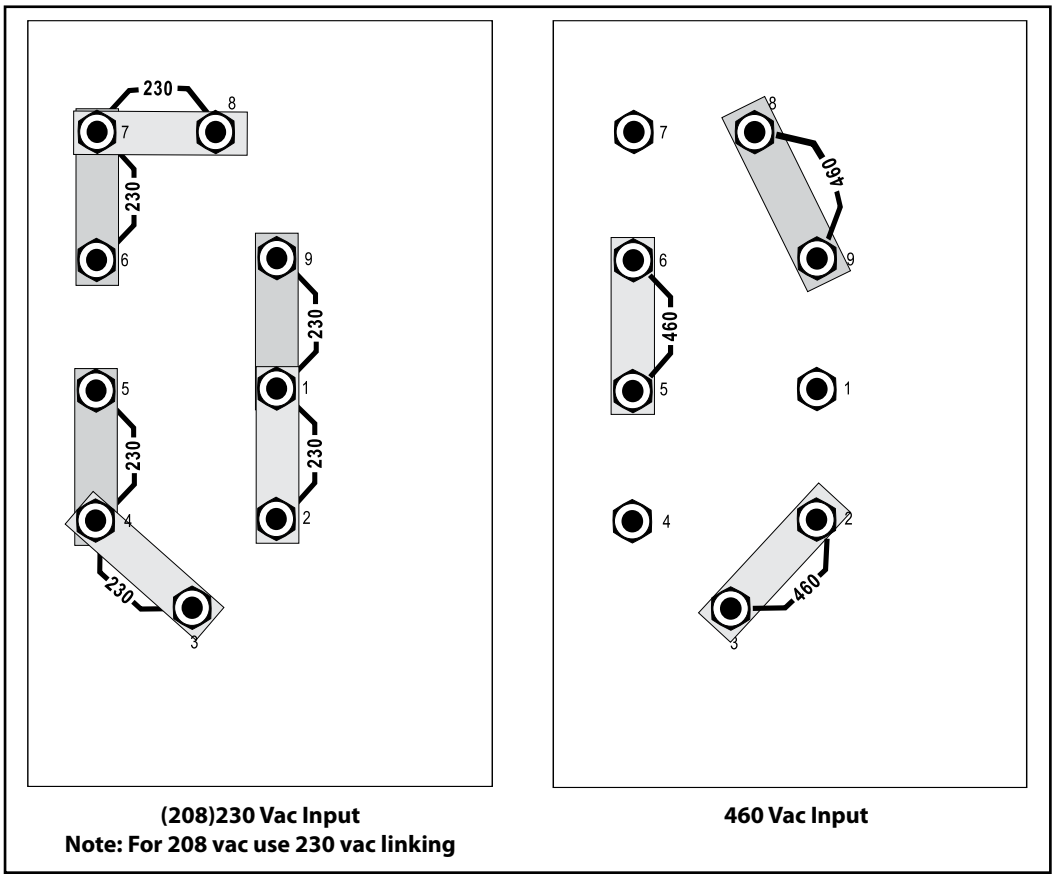


Figure 3-4. Input Terminal Board Configuration for 230/460 Model

D. Output Welding Connections (Secondary)

The output connections are located on the front panel (Figure 2-4). The positive connection is located at the bottom left corner and the negative connection is located at the bottom right corner. Table 3-2 provides the recommended secondary cable output sizes.

1. Connections From The Wire Feeder

The secondary output cable connects (in most cases) between the positive output lug of the MultiPower 460 Pulse and the power connection block of the wire feeder. See the wire feeder installation instructions for other connections such as shield gas, water, remote controls, Mig guns and wire feeder operation.

2. Connections For Stick And Tig Welding

The Tig torch and stick electrode holder connect directly to the appropriate MultiPower 460 Pulse output lugs on the lower front panel. The choice of the Positive or Negative terminal depends on the welding process and electrode type being used. In most cases the Tig torch will connect to the negative lug and work cable will connect to the positive lug. The stick electrode holder usually connects to the positive lug and the work cable to the negative lug.

Table 3-2. Output Cable Sizes (Secondary)

Welding Current	Total Length (Feet) of Cable in Weld Circuit*				
	50	100	150	200	250
100	6	4	3	2	1/0
150	4	3	1	1/0	2/0
200	3	1	1/0	2/0	3/0
250	2	1/0	2/0	3/0	4/0
300	1	2/0	3/0	4/0	4/0
400	2/0	3/0	4/0	4/0	2-2/0
500	3/0	3/0	4/0	2-2/0	2-3/0

* Total cable length includes work and electrode cables. Cable size is based on direct current, insulated copper conductors, 100-percent duty cycle and a voltage drop of 4 or less volts. The welding cable insulator must have a voltage rating that is high enough to withstand the open circuit voltage of the power source.

WARNING **BEFORE MAKING ANY CONNECTIONS TO THE POWER SOURCE OUTPUT TERMINALS MAKE SURE THAT ALL PRIMARY INPUT POWER TO THE MACHINE IS OFF.**

4.0. Operation

A. Wire Feeder Compatibility

The MultiPower 460 Pulse power source is designed for use with "Off the Arc" or "Voltage Controlled" wire feeders. These types of wire feeders can be operated in either the CV (MIG) or CC (Stick) mode. The wire feed speed is always controlled from the wire feeder using the wire speed knob on the feeder control panel. The MP-460 Pulse can output either CV or CC power. Use the PANEL/REMOTE switch in the PANEL position to set the power source open circuit voltage (OCV) for the CV mode or the welding current for the CC mode. Use the REMOTE position when using a remote control device.

CAUTION

Never operate the power source with the covers removed. In addition to the safety hazards, improper cooling may cause damage to the components. Keep side panels and top closed when unit is energized. Welding helmet, gloves, and other personal protection should always be worn when welding.

B. Digital Display Preset Mode

The digital displays located on the left side of the control panel are multifunctional depending on the welding process being used. The MultiPower 460 Pulse digital display meters permit preset of the wire feed speed on wire feeders without digital displays.

NOTE

The digital wire feed speed meter on the MultiPower front panel reads a maximum of 760 ipm. Some wire feeders have speed ranges that exceed this maximum limit of the digital meter. Wire feed speeds above 760 ipm will be displayed at 760 ipm.

1. Preset Mig Welding

In the MIG process mode, the digital displays will read preset wire feed speed in inches per minute and preset arc volts when the PRESET button is pressed. Once welding begins, the displays will show average welding current and volts in the top and bottom display, respectively. The displays have a "HOLD" circuit that retains the welding conditions. After welding stops, the display will continue to show the last average welding current and voltage sampled for 10 seconds, then returns to "0".

2. Preset Tig And Stick Welding

In the TIG and STICK process mode, you must depress and "HOLD" the PRESET button while presetting the welding current in the top display. Releasing the preset button causes the display to return to zero. Once welding begins, the display will show average welding current and volts in the top and bottom display, respectively. After welding stops, the current display will again return to zero. There is no "HOLD" circuit for the display meters when using the TIG and STICK process modes.

NOTE

The digital volt meter on the MultiPower front panel reads a maximum of approximately 75 VDC even if the OCV (Open Circuit Voltage) is higher. The MultiPower 460 has the following OCV"s:
STICK - 75 to 80 Vdc,
TIG - 38 to 42 Vdc
MIG - 11 to 44 Vdc.

CAUTION **When the WELD PROCESS switch is moved to the TIG or STICK position, electrode becomes electrically "HOT". Do not allow the electrode to contact ground potential until you are ready to make a weld.**

C. Tig Welding (Lift Start Tig)

When the PROCESS switch is placed in the LIFT START TIG position, the MultiPower 460 Pulse is automatically set for CC (constant current) welding using the ESAB Lift Start TIG starting method. The voltage and current at the output terminals are maintained at low values until the electrode is shorted to the workpiece then "lifted" to create the welding arc.

1. Be sure to set the polarity to DCEN (Electrode Negative) by connecting the Tig torch to the negative terminal lug on the front of the power source.
2. Place the WELD PROCESS switch in the LIFT START TIG position.
3. Place the PANEL/REMOTE switch in the PANEL position.
4. Place STANDARD/MIG PULSE switch in the STANDARD position.
5. While depressing the PRESET button, turn the VOLTAGE/CURRENT knob to the desired weld current as displayed on the top digital display window.
6. Set the shielding gas flow rate to a desired flow by adjusting the adjustment knob on the flowmeter. (20 cfh is typically recommended)
7. Touch the tungsten electrode to the workpiece momentarily then lift the electrode 1/16" off the workpiece to establish the welding arc. Trim the weld current as desired by turning the VOLTAGE/CURRENT knob.

NOTE

When using a remote current device with the MP-460 Pulse, the STANDARD/MIG PULSE switch must be in the STANDARD position for proportional current control. Set the current knob on the MP-460 Pulse front panel to the maximum desired weld current using the procedure above. The remote device will then control the current proportionally between the minimum current setting of 5 amps and maximum set on the MP-460 front panel. The maximum Tig welding current is 525 amps.

If the MP-460 PANEL/REMOTE switch is left in the REMOTE position while using a remote control option device, the current range will be full scale or 10 to 400 amps on the remote device. Adjustment of the maximum current on the MP-460 Pulse front panel is defeated.

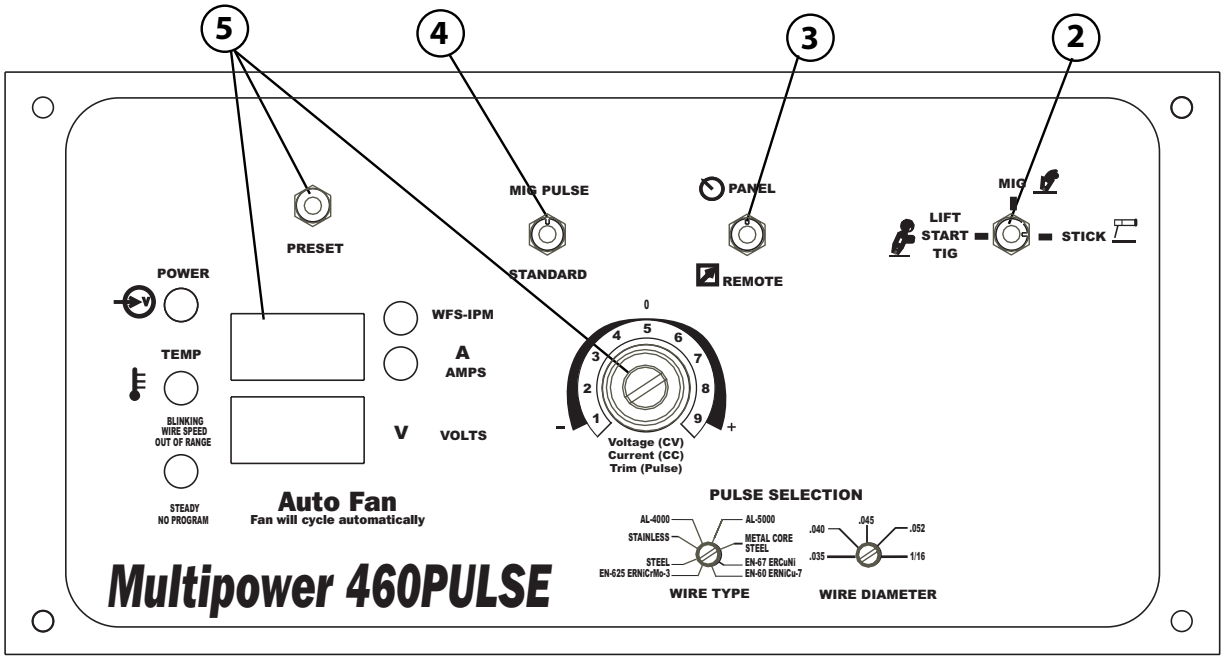


Figure 4-1 Standard Tig Setup Procedure

CAUTION **When the WELD PROCESS switch is moved to the TIG or STICK position, electrode becomes electrically "HOT". Do not allow the electrode to contact ground potential until you are ready to make a weld.**

D. Stick Welding

When the PROCESS switch is placed in the STICK position, the MultiPower 460 Pulse establishes open circuit voltage (OCV) and output power is immediately available for welding. This means that the STICK electrode holder is "HOT", and an arc will strike when the electrode comes in contact with the workpiece.

Arc Force is automatically enabled when the WELD PROCESS switch is set to the STICK position. The level of Arc Force is automatically adjusted by the current preset being used. Due to the "Built-In" Arc Force in the stick mode, the actual current may be greater than the preset value.

1. Be sure to set the polarity to DCEP (Electrode Positive) by placing the Electrode Holder cable in the Positive connection lug on the front of the power source.
2. Place the WELD PROCESS switch in the STICK position.
3. Place the PANEL/REMOTE switch in the PANEL position.
4. Place STANDARD/MIG PULSE switch in the STANDARD position.
5. While holding the PRESET button, turn the VOLTAGE/CURRENT knob to the desired weld current displayed in the top digital display window for the stick electrode type and size being used .
6. Strike the electrode on the workpiece and start welding. Trim the welding current as needed for the desired weld pool control.

NOTE

When using the MP-460 Pulse with an Optional Remote Pendent Control , the STANDARD/MIG PULSE switch must be in the STANDARD position for proportional current control. Set the current knob on the MP-460 Pulse front panel to the maximum desired weld current level. The remote device will then control the current proportionally between the minimum current setting of 5 amps and the maximum current set on the MP-460 Pulse front panel. The maximum Stick welding current is 525 amps.

If the MP-460 PANEL/REMOTE switch is left in the REMOTE position while using a Remote Pendant Control option, the current range will be full scale or 10 to 400 amps on the remote device. Adjustment of the maximum current on the MP-460 Pulse front panel is defeated.

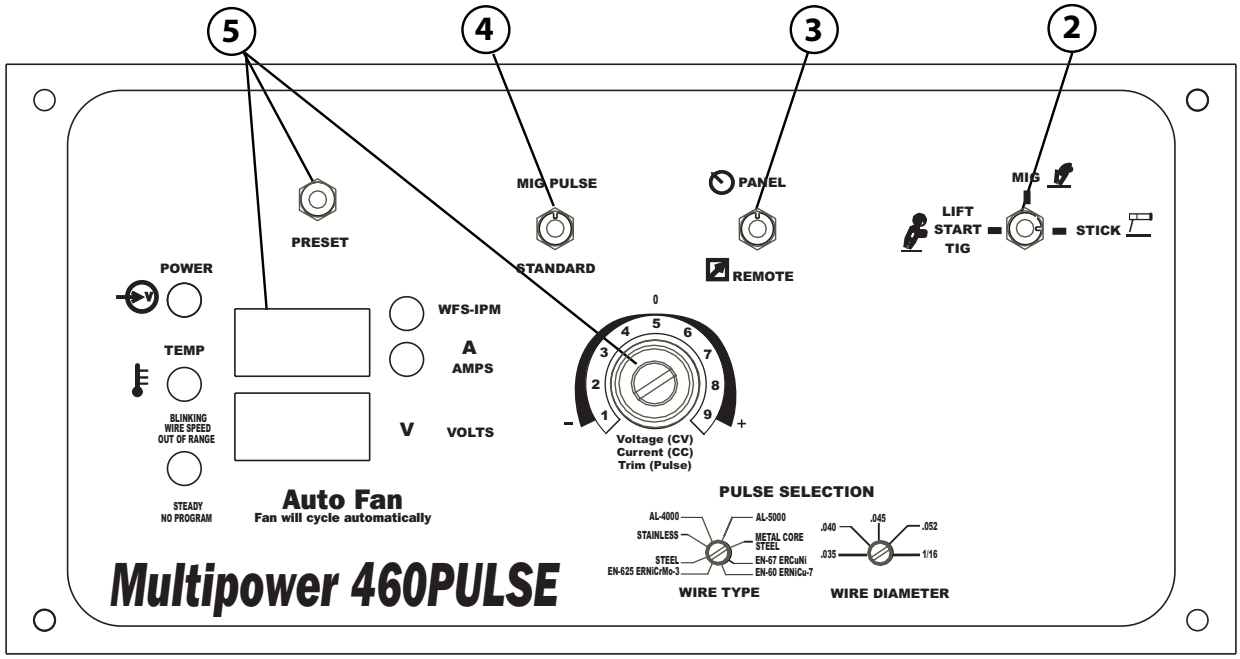


Figure 4-2 Standard Stick Setup Procedure

CAUTION **When the WELD PROCESS switch is moved to the TIG or STICK position, electrode becomes electrically "HOT". Do not allow the electrode to contact ground potential until you are ready to make a weld.**

E. Air Carbon Arc Gouging (CAC-A) - Constant Current

1. Be sure the CONTACTOR "ON/OFF" switch on the lower left auxiliary panel is in the OFF position.
2. Place the Output PANEL/REMOTE switch into PANEL position if output current is regulated from the VOLTAGE/CURRENT knob on the power source front panel, or in REMOTE position if output current is regulated from the optional MP-460 Remote Pendant Control.
3. Place the Process Control switch in the STICK position.
4. Press and hold the PRESET button and set the VOLTAGE/CURRENT knob to gouging current.
5. Place STANDARD/MIG PULSE switch in the STANDARD position.
6. Turn the air on the gouging electrode holder "ON and start gouging by touching or scratch starting the electrode.

NOTE

Due to the "Built-In" Arc Force in the stick mode, the actual current may be greater than the preset value.

See Remote Pendant Control Device operation notes under STICK welding on previous page.

WARNING

Arc gouging with the "Off the Arc" contactor switch in the "ON" position (CV Mode) is not recommended as standard practice or the best method for carbon arc gouging .

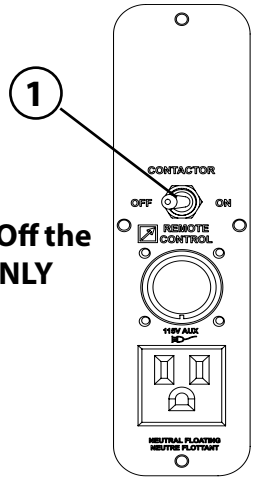


Figure 4-3
Contactor Switch for "Off the Arc" wire feeders ONLY

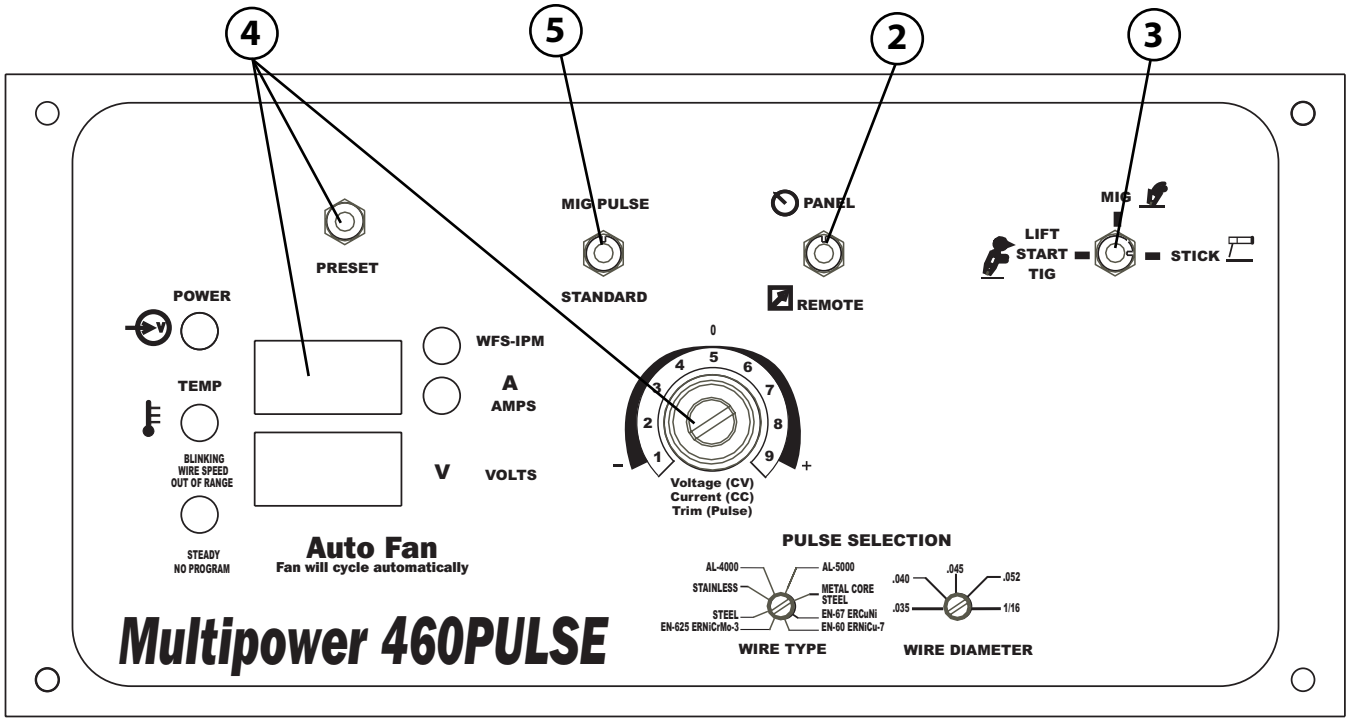


Figure 4-4 Carbon Arc Setup Procedure

CAUTION **When the CONTACTOR switch is moved to the "ON" position, MP-460 Pulse output terminals and the cables connected to them become electrically "HOT". Do not allow the cable to contact ground potential.**

F. Mig & Flux Core Welding Preset Procedure

When the PROCESS switch is placed in the MIG position, the MultiPower 460 Pulse is set for CV (constant voltage) welding for use with "Off the Arc" or "Arc Voltage " type wire feeders. With these feeders, power to run the wire feed motor and accessories is suppied by the MP-460 Pulse output voltage. There is no contactor "ON" signal from the wire feeder to tell the power source to turn "ON". Therfore, the contatctor is turned "ON" manually to supply power to the wire feeder. When the Mig gun trigger is pulled, wire feed begins and power is supplied to the gun through the secondary contactor in the wire feeder unit. The following procedure assumes that the wire and gas have been installed.

1. Connect wire feeder to MultiPower 460 Pulse and set PANEL/REMOTE switch to PANEL position.
2. Set the STANDARD/MIG PULSE switch to the STANDARD position.
3. Place the WELD PROCESS switch in the MIG (center) position.
4. Press and release the PRESET button then turn the VOLTAGE to the approximate welding voltage needed for the wire type and size to be used. If the MIG CONTACTOR is in the "ON" position the PRESET button must be held down to preset the wire feed speed.
5. Flip the CONTACTOR switch on the MP-460 auxiliary panel to the "ON" position. See Fig. 4-6.
6. Turn the wire speed knob <u>on the wire feeder</u> to the desired wire feed speed.
7. Connect the work cable from the MP-460 and the voltage pick-up lead from the wire feeder to the part to be welded.
8. Activate the gas purge switch if the wire feeder has this feature. If not, release the pressure roll so wire does not feed. Pull the gun trigger and set the shielding gas flow rate by turning the adjustment knob on the shield gas flowmeter to the recommended gas flow (typically 35 cfh).
9. Engage the drive stand pressure roll and begin welding by pulling the gun trigger. Trim the wire speed and volts as needed for the desired arc characteristics and weld quality.

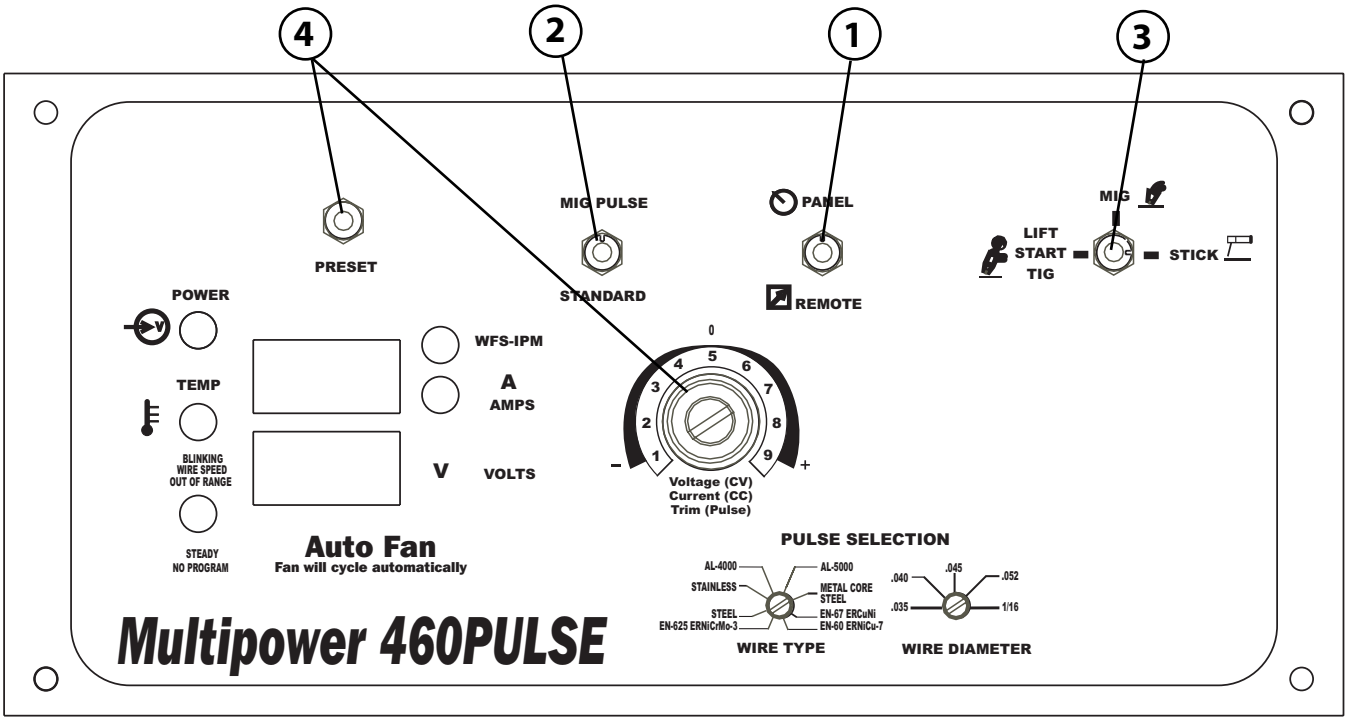


Figure 4-5 Standard Mig Setup Procedure

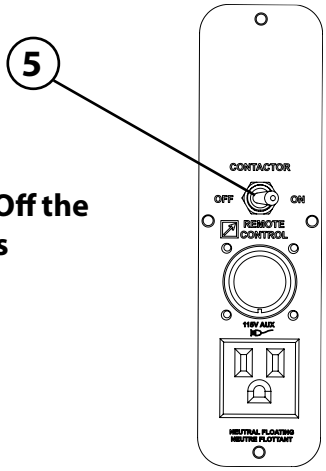


Figure 4-6
Contactor Switch for "Off the Arc" wire feeders

NOTE

When using the MP-460 Remote Pendant Control, place the PANEL/REMOTE switch in the REMOTE position. This will defeat the MP-460 front panel voltage control. Voltage can then be adjusted from the remote pendant

G. Pulse Mig Setup

1. Connect wire feeder to MultiPower 460 Pulse and set PANEL/REMOTE switch to PANEL position.
2. Set the STANDARD/MIG PULSE switch to the MIG PULSE position.
3. Place the WELD PROCESS switch in the MIG (center) position.
4. Set the PULSE SELECTION switches to the WIRE TYPE and DIAMETER installed on the wire feeder.
5. Press and release the PRESET button then turn the TRIM knob to the approximate welding wire feed speed needed for the wire type and size to be used. If the MIG CONTACTOR is in the "ON" position the PRESET button must be held down to preset the wire feed speed.
6. Flip the CONTACTOR switch on the MP-460 auxiliary panel to the "ON" position. See Fig. 4-6.
7. Turn the wire speed knob <u>on the wire feeder</u> to the desired wire feed speed.
8. Connect the work cable from the MP-460 and the voltage pick-up lead from the wire feeder to the part to be welded.
9. Activate the gas purge switch if the wire feeder has this feature. If not, release the pressure roll so wire does not feed. Pull the gun trigger and set the shielding gas flow rate by turning the adjustment knob on the shield gas flowmeter to the recommended gas flow (typically 35 cfh).
10. Engage the drive stand pressure roll and begin welding by pulling the gun trigger. Trim the arc length using the wire speed control knob on the wire feeder. Adjust the heat content of the arc by increasing or decreasing the Trim knob on the MP-460 Pulse front panel.

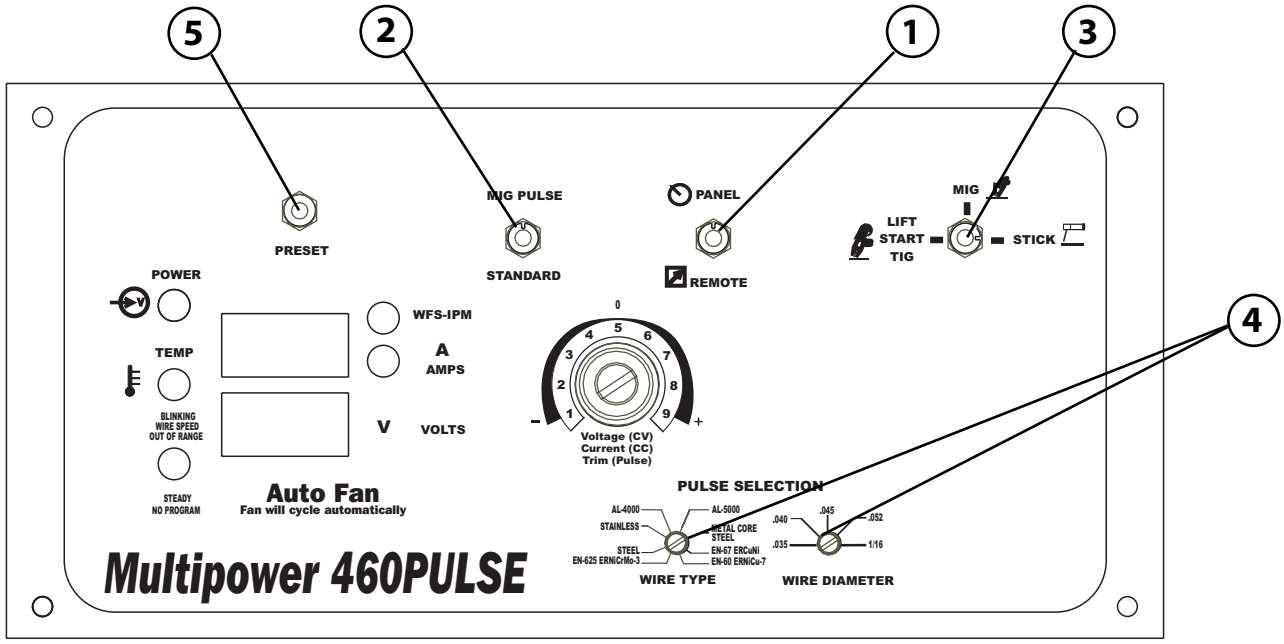


Figure 4-7 Synergic Pulse MIG Setup

H. Pulse Mig Welding using "Off the Arc" Wire Feeders

The MultiPower 460 Pulse is designed to provide simple to use, high quality, preprogrammed pulsed Mig welding. The pulse parameters, such as pulse height, pulse width, background current and pulse frequency, are automatically adjusted by the MultiPower 460 Pulse depending on the WIRE TYPE and DIAMETER selected.

When the PROCESS switch is placed in the MIG position and the STANDARD / MIG PULSE switch is placed in the MIG PULSE position, the MultiPower 460 Pulse is set for pulse Mig welding. The TRIM Knob on the MP-460 Pulse front panel allows the operator to preset the wire feed speed and optimize the heat content of the welding arc. An initial wire feed speed setting using the TRIM Knob will determine the pulse parameters to be used. Use this knob to increase (clockwise) or decrease (counterclockwise) the welding arc heat content to achieve the required electrode wire burn off rate and weld depth of fusion. Fine tuning of the arc length is accomplished at the wire feeder by adjusting the wire feed speed knob.

The MultiPower 460 Pulse preprogammed WIRE TYPES, WIRE DIAMETERS and shielding gases are listed in Table 4-1.

Table 4-1. Wire Types, Diameter and Shield Gases for Pulse Mig

Material Type	Diameters	Shielding Gas (AWS Designation)
Carbon Steel	.035, .040, .045, .052, .062	Ar - 5% CO2 (SG-AC-5 Ar - 8% CO2 (SG-AC-8) Ar - 10% CO2 (SG-AC-10) Ar - 2% O2 (SG-AO-2) Ar - 8% CO2 - 2% O2 (SG-ACO-8/2)
Stainless Steel	.035, .040, .045, .062	Ar -2% CO2 (SG-AC-2) Ar - 8% CO2 (SG-AC-8) Ar - 2% O2 (SG-AO-2) Ar - 8% CO2 - 2% O2 (SG-ACO-8/2) Ar - He
4000 & 5000 Aluminum	.035, .040, 3/64, .062	Ar (SG-A) Ar - He 25% (SG-AHe-25) Ar - He 50% (SG-Ahe-50)
Metal Core Carbon Steel	.035, .040, .045, .052, .062	Ar - 5% CO2 (SG-AC-5) Ar - 8% CO2 (SG-AC-8) Ar - 10% CO2 (SG-AC-10) Ar - 2% O2 (SG-AO-2) Ar - 8% CO2 - 2% O2 (SG-ACO-8/2)
EN-67 ERCuNi	.035	100% Ar (SG-A)
EN-60 ERNiCu-7	.035	He - 25% Ar (SG-HeA-25)
EN-625 ERNiCrMo-3	.035, .045	Ar - 35% He (SG-AHe-35)

1. Pulse Mig Arc Stability

Many variables can affect the arc stability of pulse MIG welding. Some examples are:

- Differences in shielding gas compositions
- Differences in weld wire chemistry
- Water vs. air cooled guns
- Base metal surface condition
- Tip-to work distance
- Variations on wire feed speed
- Wire feedability
- Long welding cables
- High resistance cables and connections

When adverse conditions are present, the pulse arc stability is sometimes less than desirable. The arc will "crackle" and produce higher than normal spatter levels. This can occur when high resistances in the welding circuit cause changes in pulse waveform affecting average current levels. The MP-460 TRIM knob and wire feeder speed control knob should be used to adjust the pulse parameters to accommodate small changes in the welding equipment set-up, base material variations and maintain a stable pulse welding condition. Mechanical wire feeding inconsistencies will significantly affect pulse arc stability that require correction before fine tuning trim setting .

2. Shielding Gases

Table 4-1 lists the types of shielding gas mixtures that can be used with the MultiPower 460 Pulse. The wire burn-off rate and pulse operation can vary with changes in shielding gas. Use the wire feed speed to compensate for small changes in shield gas composition.

3. Mig Pulsing with Wire Alloys Not Preprogrammed

The MultiPower 460 Pulse permits pulse welding when the Mig wire type or diameter installed on the wire feeder does not have specific pulse parameters available through panel selection. By using a combination of wire feed speed and MP-460 Pulse front panel TRIM setting, the pulse Mig welding arc can be fine tuned and stabilized for many different wire types and diameters. The selectable pulse parameters can be any combination of WIRE TYPE or WIRE DIAMETER selected using the PULSE SELECTION switches. Not all combinations will produce acceptable pulse characteristics but, in many cases, reasonable pulse arc welding stability can be achieved. This process will take some trial and error but the added flexibility and expanded pulse range might be beneficial for specialty or rare welding applications.

5.0. Maintenance And Troubleshooting

A. Cleaning

Periodically, remove the cover from the power source and blow accumulated dust and dirt from the air passages and interior components by using clean low pressure air. The frequency of cleaning required depends upon the environment in which the power source is used.

It is imperative that all air passages be kept as clean as possible in order to allow adequate air flow to provide proper cooling.

After cleaning with low pressure air, check for and tighten any loose hardware, including all electrical connections. Check for frayed and/or cracked insulation on all power cables and replace if necessary.

B. Inspection And Service

Keep the power source dry, free of oil and grease, and protected at all times from damage by hot metal and sparks.

C. Fan Motor

Keep the fan motor free of accumulated dust and lint.

D. Transformer

Other than periodically cleaning the dust and dirt from the transformer, no maintenance is required. Ensure that only clean, dry, low pressure air is used.

E. Wire Feeder Control Circuits

These circuits are protected by one 10 amp circuit breaker mounted in the front panel. If it is open, the contactor and wirefeeder will not operate.

F. Over Temperature Protection

If the power source reaches an abnormally high internal temperature, the thermal protection will deenergize the contactor circuit, shutting down the power source but leaving the cooling fan on. After the power source has cooled to a safe level, the thermal protection will automatically reset.

G. IGBT Handling and Replacement

WARNING **STATIC ELECTRICITY CAN DAMAGE CIRCUIT BOARDS AND ELECTRONIC COMPONENTS.**

- **OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.**
- **USE PROPER STATIC--PROOF BAGS AND BOXES.**

What is ESD?

A sudden transfer or discharge of static electricity from one object to another. ESD stands for Electrostatic Discharge.

How does ESD damage occur?

ESD can cause damage to sensitive electrical components, but is not dangerous to people. ESD damage occurs when an ungrounded person or object with a static charge comes into contact with a component or assembly that is grounded. A rapid discharge can occur, causing damage. This damage can take the form of immediate failure, but it is more likely that system performance will be affected and the component will fail prematurely.

How do we prevent ESD damage?

ESD damage can be prevented by awareness. If static electricity is prevented from building up on you or on anything at your work station, then there cannot be any static discharges. Nonconductive materials (e.g. fabrics), or insulators (e.g. plastics) generate and hold static charge, so you should not bring unnecessary nonconductive items into the work area. It is obviously difficult to avoid all such items, so various means are used to drain off any static discharge from persons to prevent the risk of ESD damage. This is done by simple devices: wrist straps, connected to ground, and conductive shoes.

Other handling precautions that should also be observed are as follows:

- Work surfaces, carts and containers must be conductive and grounded, use only antistatic packaging materials. Overall, handling of ESD--sensitive devices should be minimized to prevent damage.
- Never install devices into systems with power connected to the system.
- Use soldering irons with grounded tips when soldering to gate terminals.

G. IGBT Handling and Replacement (continued)

Since IGBT gates are insulated from any other conducting region, care should be taken to prevent static build up, which could possibly damage gate oxides. All IGBT modules are shipped from the factory with conductive foam contacting the gate and emmiter sense pins.

When mounting IGBT modules on a heatsink, certain precautions should be taken to prevent any damage against a sudden torque. If a sudden torque ("onesided tightening") is applied at only one mounting terminal the ceramic insulation plate or silicon chip inside the module may get damaged. The mounting screws are to be fastened in the order shown in Figure 5-1. Also, care must be taken to achieve maximum contact (i.e. minimum contact thermal resistance) for the best heat dissipation. Application of a thermal pad on the contact surface improves it thermal conductivity. See Replacement Parts section for the required pad. A torque wrench should be used. Tighten mounting screws to 28 in-lbs (3.2 m-n); wire connecting screws to 19 in-lbs (2.1 m-n). If torque is too heavy, the device can damage like the above "one-sided tightening".

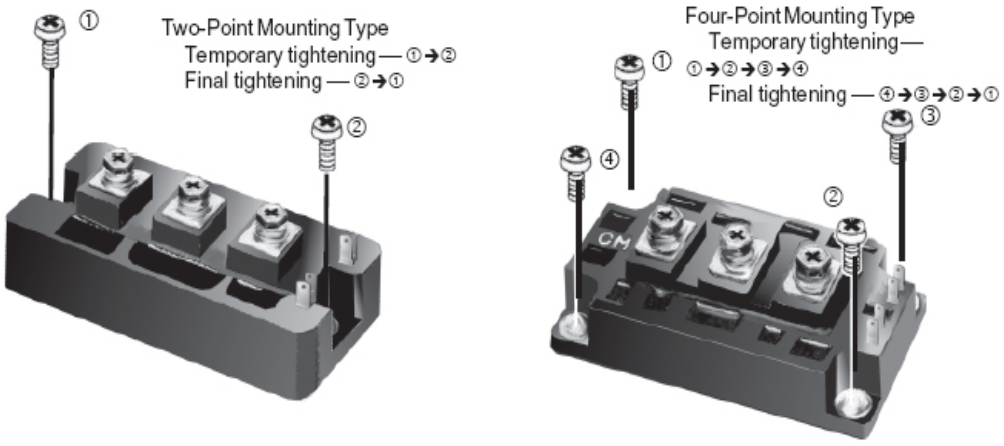
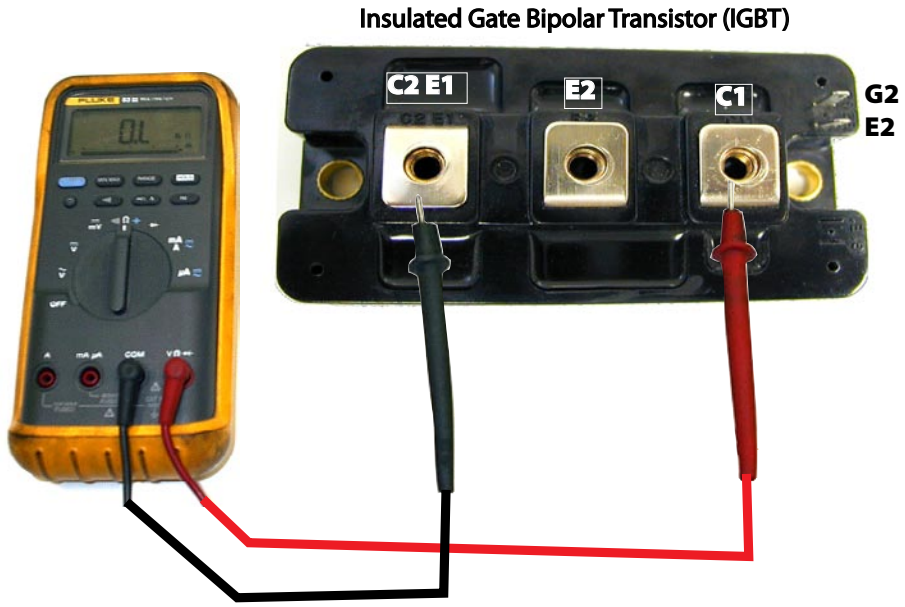
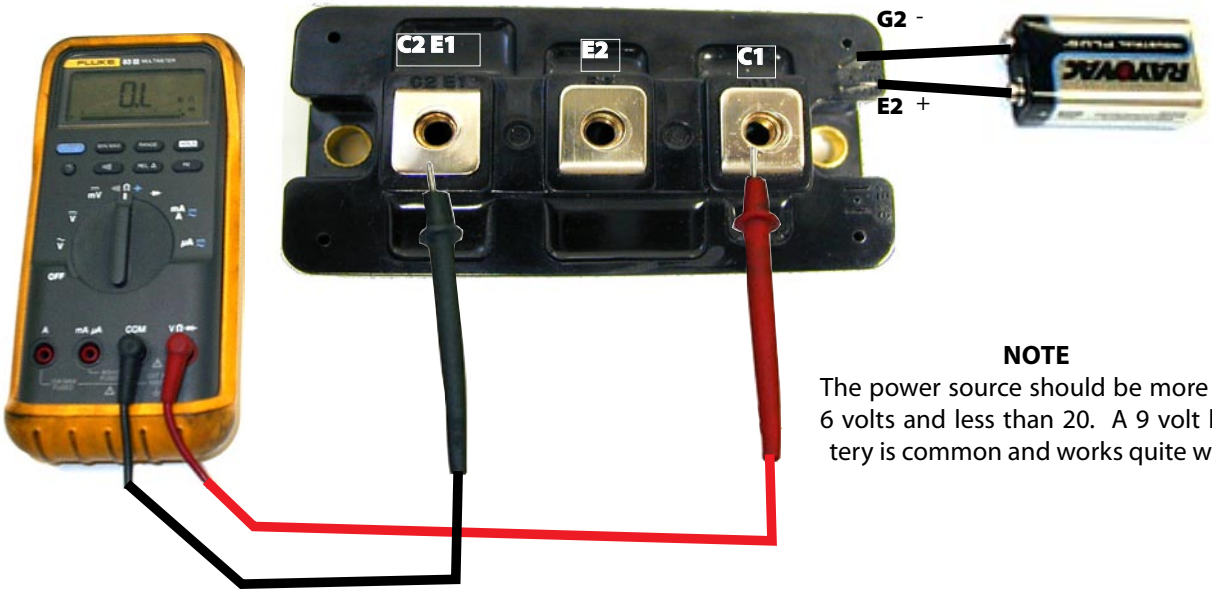


Figure 5-1 Mounting Screw Installation

G. IGBT Handling and Replacement (continued)



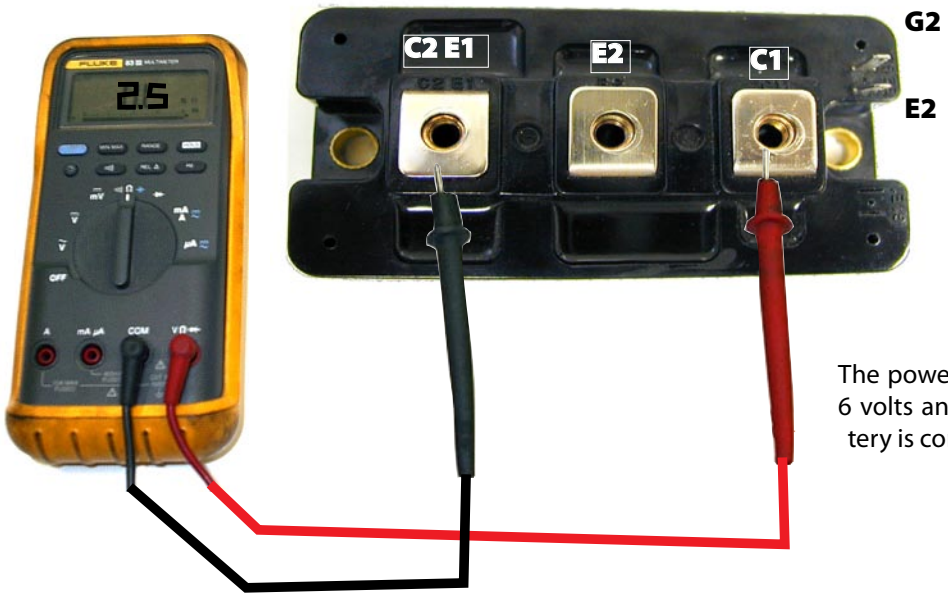
Set the VOM to ohms then check for continuity between all the legs of the IGBT. No continuity should be measured. Place the red probe to the Collector (C1) and the black probe to the Emitter (E1). The VOM should read very high resistance or an open circuit. No shorts (continuity) should be measured. Repeat the steps on the second IGBT pair (C2 E2). This ensures the IGBT is turned off.



NOTE
The power source should be more the 6 volts and less than 20. A 9 volt battery is common and works quite well.

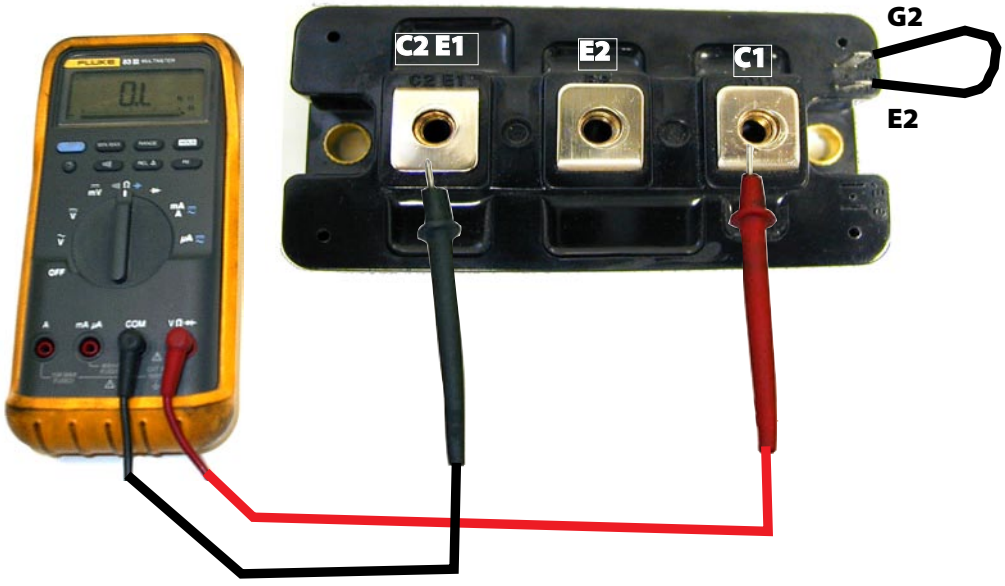
Place a DC power source (9 v battery) on the gate leads of the same IGBT. First the negative source on the gate with the positive source on the emitter. This should not change the meter reading. Next place the positive source on the gate and the negative source on the emitter. This should turn on the IGBT.

G. IGBT Handling and Replacement (continued)



NOTE
The power source should be more the 6 volts and less than 20. A 9 volt battery is common and works quite well.

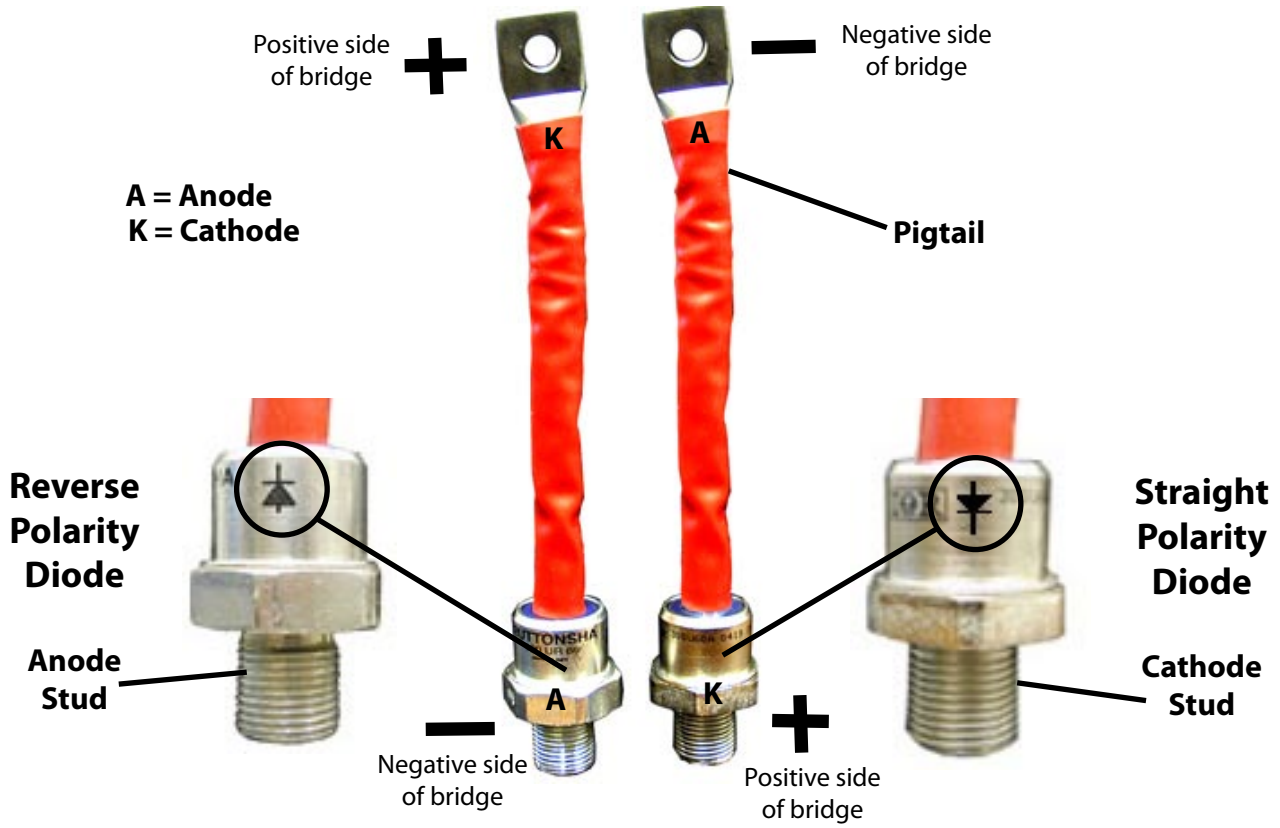
Once the IGBT is turned on, remove the power source and the unit should stay on.



Short the gate leads (you can use your finger) to turn the unit off. This demonstrates the correct functioning of the unit.

H. Procedure for Checking Diodes

Inspect the diode to determine if it is of the " straight polarity " or "reverse polarity" type. Refer to the following figure for typical marking of diode polarity. It is essential that a replacement diode be of the same polarity as the one removed.



Usually when a diode fails, it becomes a short circuit. A simple diode test uses the resistance circuits of a multimeter; the diode should show better conductivity in one direction than in the other.

TEST AS FOLLOWS:

1. Set the mulitmeter on the low resistance range.
2. Connect one lead to the stud and one lead to the pigtail. Read the Resistance.
3. Reverse the leads and read the resistance. It should show a higher resistance in the "blocking" direction than in the "conducting" direction. If it shows a very low, resistance (or zero resistance) in both directions, the diode is shorted. If it does not show continuity in either direction, the diode is open.

As stated above, it is essential that a replacement diode must be of the same size, type, and polarity as the one it replaces.

I. Troubleshooting

If the power source is operating improperly, the following troubleshooting information may be used to locate the source of the trouble.

Check the problem against the symptoms in the following troubleshooting guide (Table 5-1.) The remedy for the problem may be quite simple. If the cause cannot be quickly located, open up the unit and perform a simple visual inspection of all the components and wiring. Check for proper terminal connections, loose or burned wiring or components, blown fuses, bulged or leaking capacitors, or any other sign of damage or discoloration.

Table 5-1. Troubleshooting Guide

CONDITION	ACTION
Unit Inoperative	A. No input power. Check main line (user's) switch fuses -- replace if needed. B. Poor or improper input (terminal board) connections. C. Defective on/off switch -- replace. D. Thermal light on. Main transformer overheating. Also check for proper cooling, proper primary hookup, or shorted turn on secondary. E. Loss of primary phase. Find & replace defective fuse.
READY/ ON Light is OFF	**See Figure 5-2**
Fan Does Not Run	**See Figure 5-3**
(READY Light is ON) **No Output -- Fan Running**	A. Poor or improper electrical input -- check input connections on TB. B. Poor connections at output terminals/work station -- check, tighten or replace. C. Main transformer overheating -- thermal switches tripped due to restricted cooling air. Temperature light on front panel will be lit. Let unit cool down. D. PC board defective or loose PC board connector(s) -- if loose, reinsert; if defective, replace.
No Output - STICK Position	**See Figure 5-4**
Meter Display is Blank	**See Figure 5-5**
Preset Does Not Function	**See Figure 5-6**
Ammeter Displays 760 Amps	**See Figure 5-7**
Limited Output or **Low Open-Circuit Voltage**	A. Input voltage jumper links on terminal board improperly set -- check for proper voltage. B. Poor output connections. Take apart, clean, and reassemble. C. Panel-Remote switch in Remote position and remote voltage pot disabled.
Over Temperature Light is ON	**See Figure 5-8**
Erratic Weld Current	A. Welding cable size too small -- use correct cables. B. Loose welding cable connection (will usually get hot) -- tighten all connections. C. Improper wire feeder setup. D. PC board defective -- replace.
High Output, No Voltage Control	A. PC board defective or loose -- reset and/or replace board. B. Shorted I.G.B.T. - Replace I.G.B.T. and check driver PCB.
No 115 Volt ac Output	A. Circuit breaker tripped. Check 115V CB2 -- Reset.
Line Fuse Blows When Power Source is First Turned On	A. Shorted DIODE in Main Bridge -- replace. B. Shorted capacitor in Capacitor Bank.

NOTE:

Schematics and Wiring Diagrams on 11" x 17" paper are included inside the back cover of this manual.

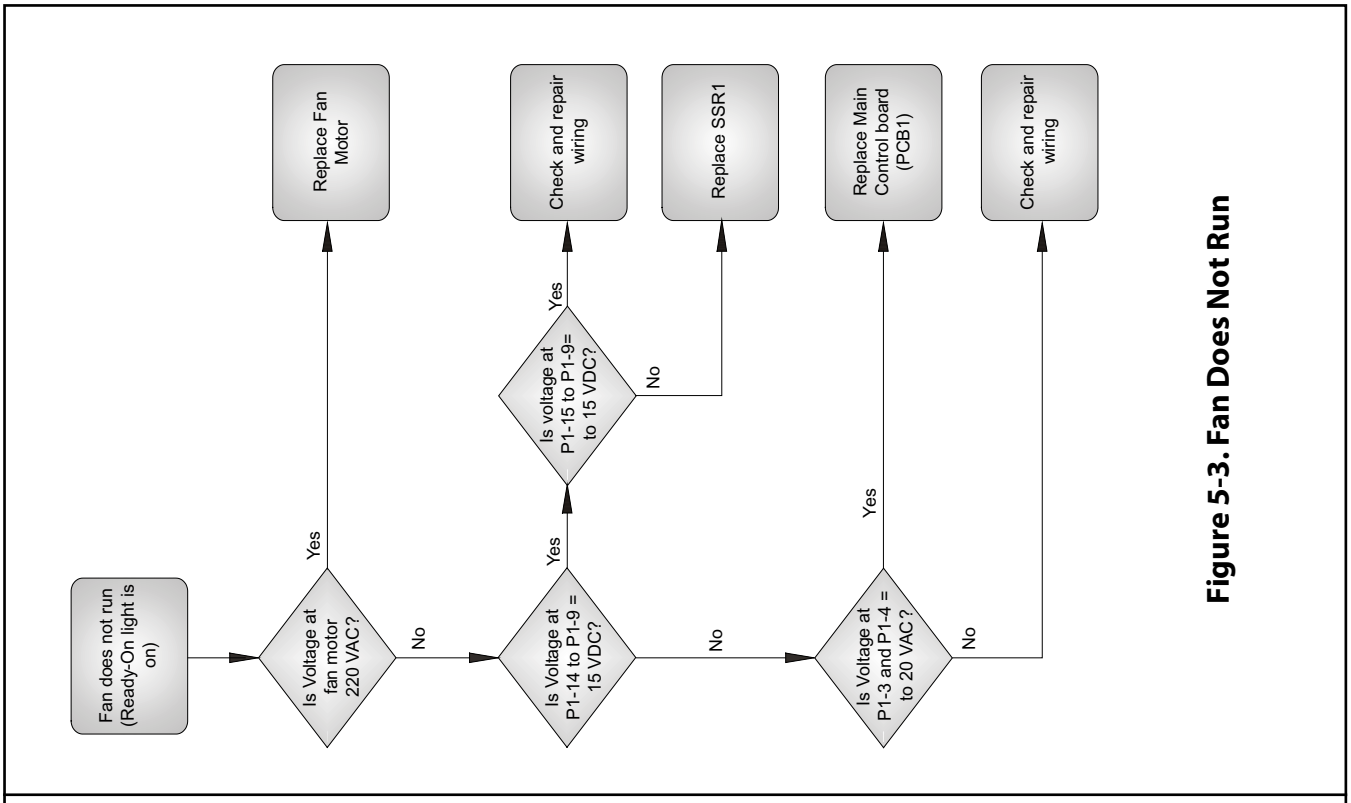


Figure 5-3. Fan Does Not Run

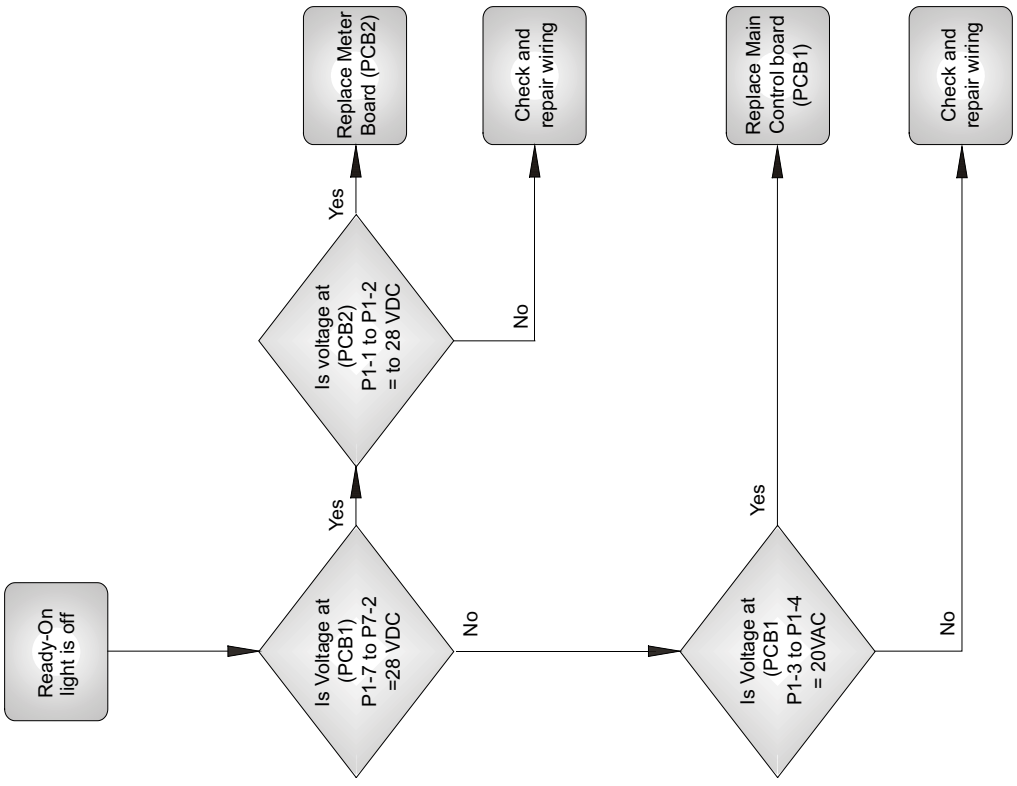

Ready-On light is off
Is Voltage at (PCB1) P1-7 to P7-2 =28 VDC
Yes
No
Is voltage at (PCB2) P1-1 to P1-2 = to 28 VDC
Yes
No
Replace Meter Board (PCB2)
Check and repair wiring
Is Voltage at (PCB1 P1-3 to P1-4 = 20VAC
Yes
No
Replace Main Control board (PCB1)
Check and repair wiring

Figure 5-2. READY/ON Light OFF

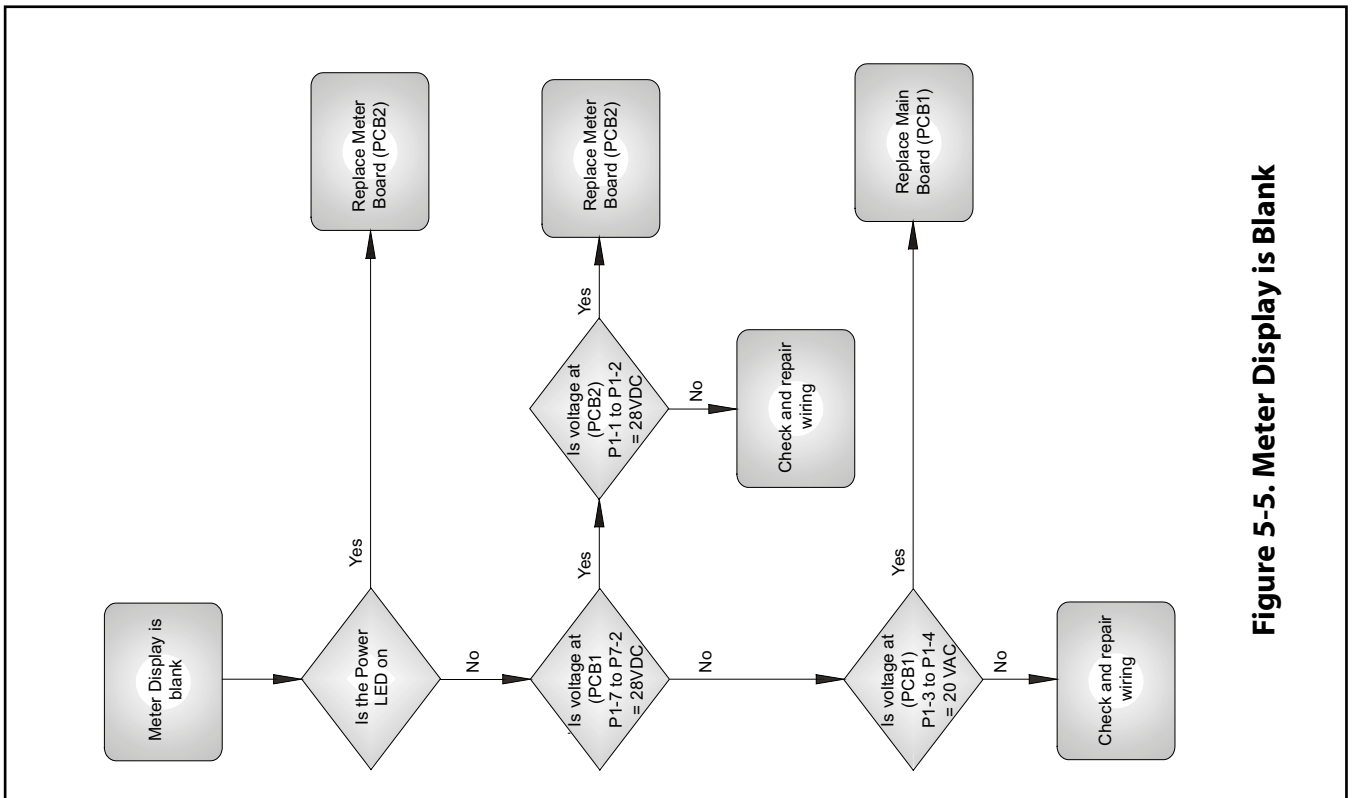


Figure 5-5. Meter Display is Blank

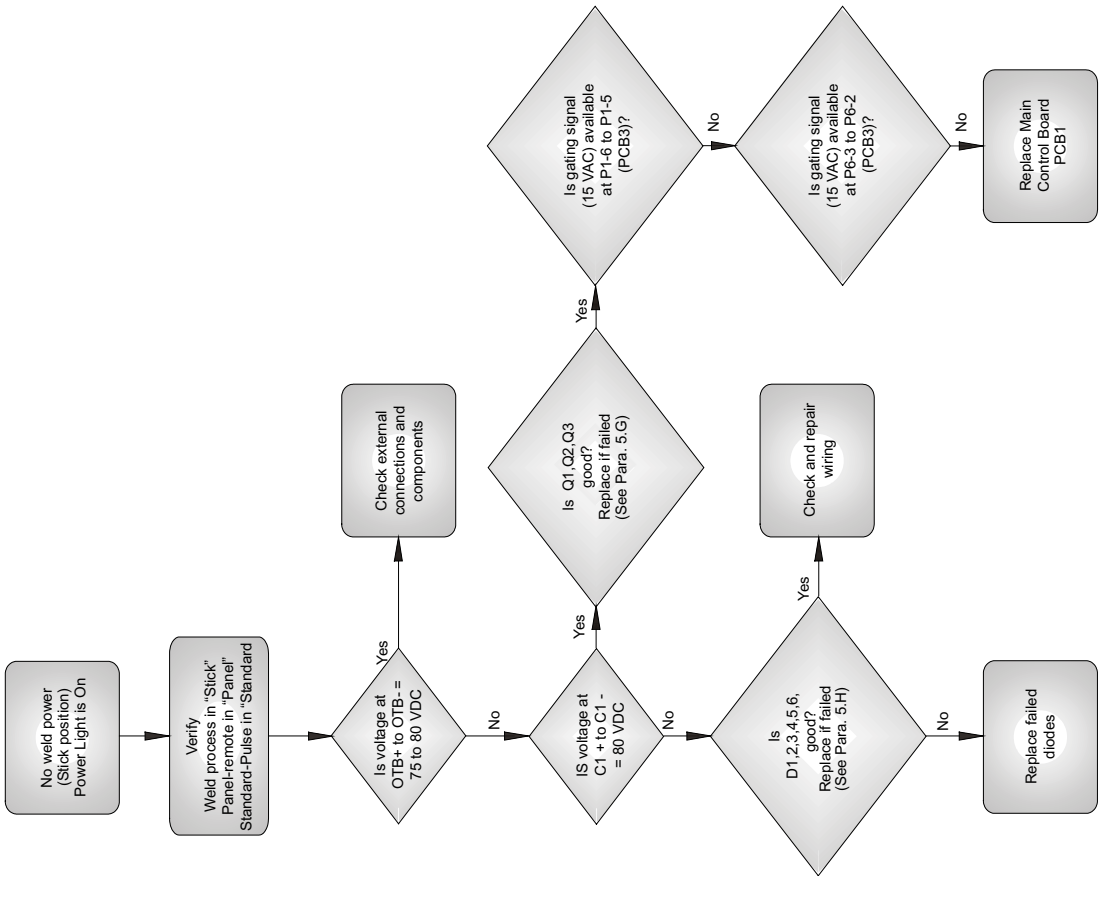

No weld power (Stick position) Power Light is On
Verify Weld process in "Stick" Panel-remote in "Panel" Standard-Pulse in "Standard
Is voltage at OTB+ to OTB- = 75 to 80 VDC
Yes
Check external connections and components
No
IS voltage at C1 + to C1 - = 80 VDC
Yes
Is Q1,Q2,Q3 good? Replace if failed (See Para. 5.G)
No
Is D1,2,3,4,5,6, good? Replace if failed (See Para. 5.H)
Yes
Check and repair wiring
No
Replace failed diodes
Yes
Is gating signal (15 VAC) available at P1-6 to P1-5 (PCB3)?
No
Is gating signal (15 VAC) available at P6-3 to P6-2 (PCB3)?
No
Replace Main Control Board PCB1

Figure 5-4. No Weld Power (STICK Position)

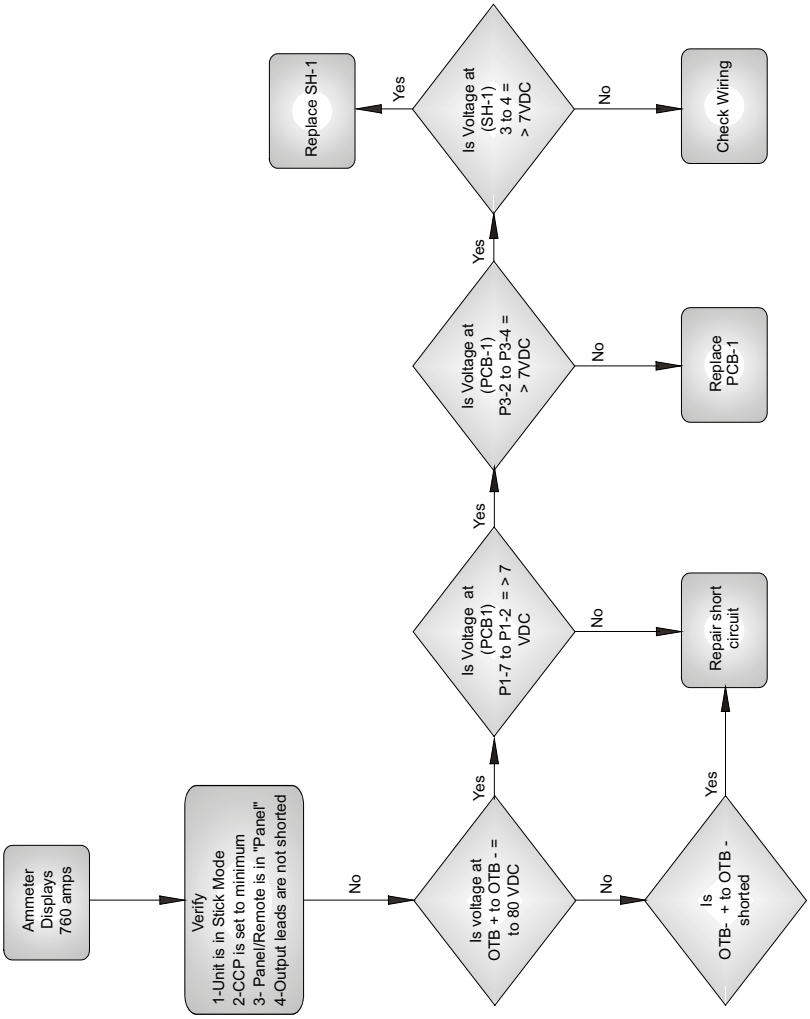


Figure 5-7. Ammeter Displays 760A

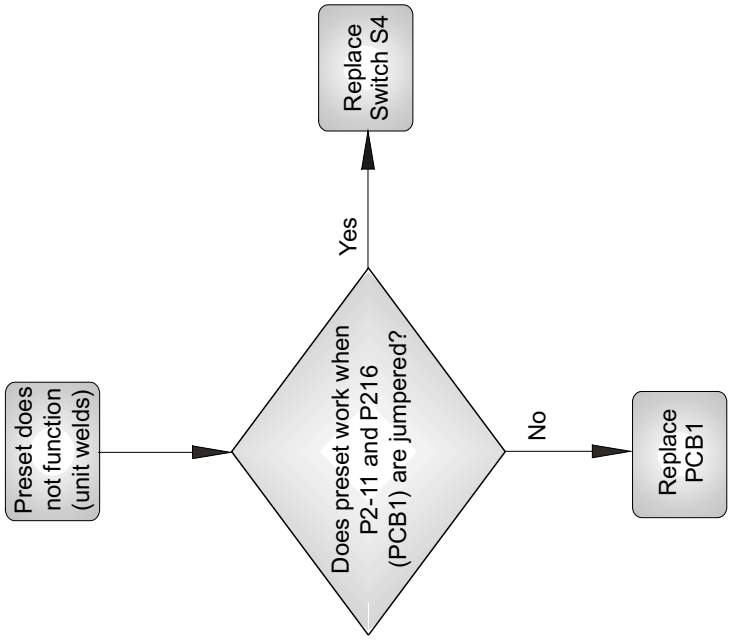


Figure 5-6. PRESET Does Not Function

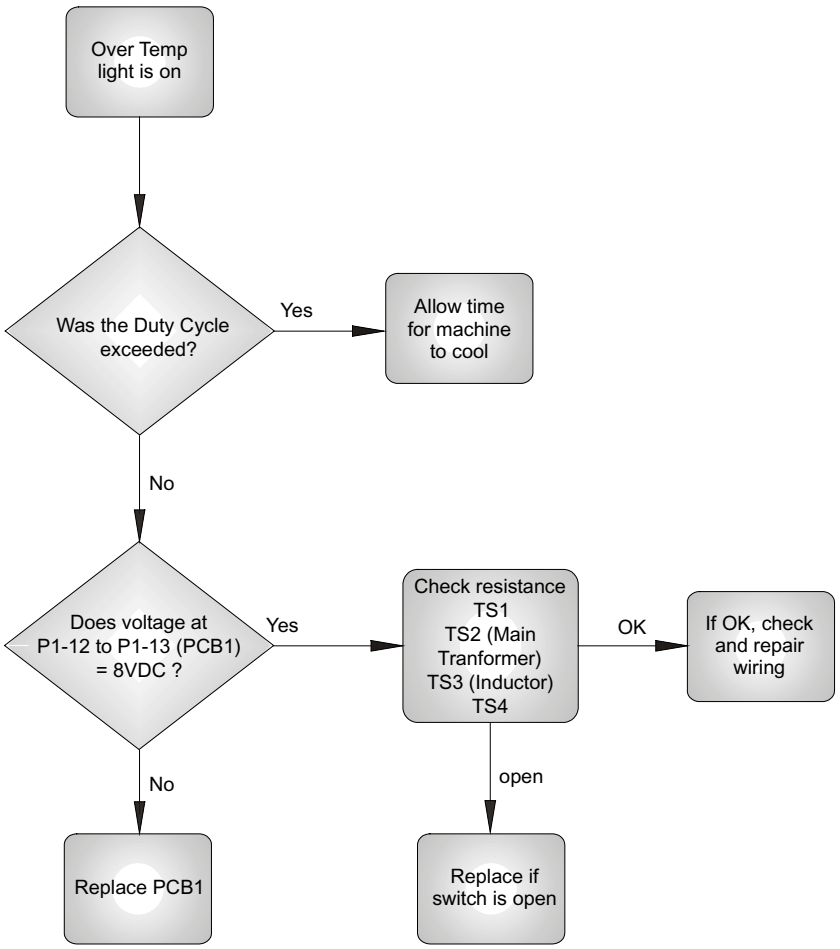


Figure 5-8. Over Temperature Light is ON

6.0 Replacement Parts

6.1 General

Always provide the serial number of the unit on which the parts will be used. The serial number is stamped on the unit nameplate.

6.2 Ordering

To ensure proper operation, it is recommended that only genuine ESAB parts and products be used with this equipment. The use of non-ESAB parts may void your warranty.

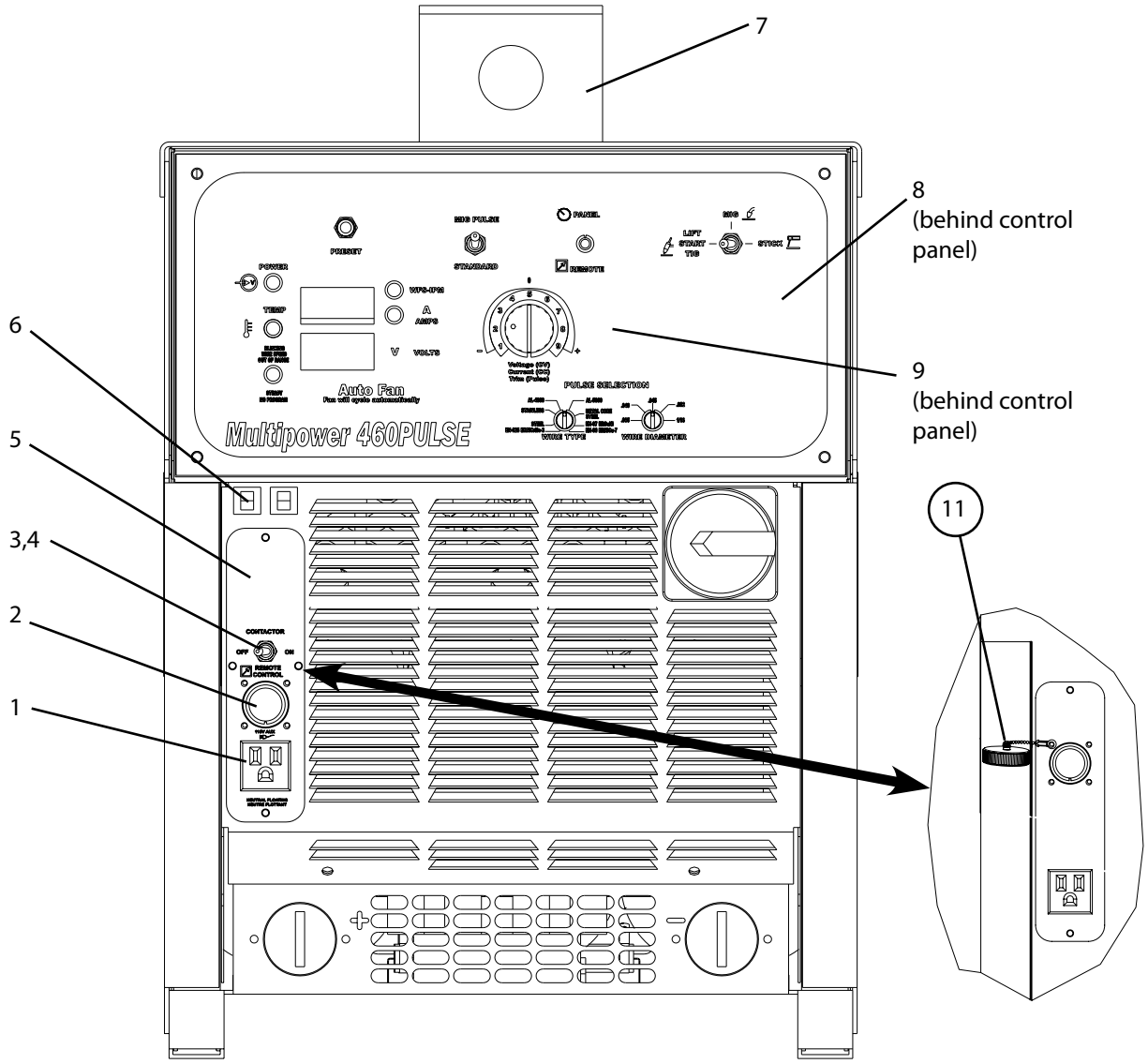
Replacement parts may be ordered from your ESAB Distributor.

Be sure to indicate any special shipping instructions when ordering replacement parts.

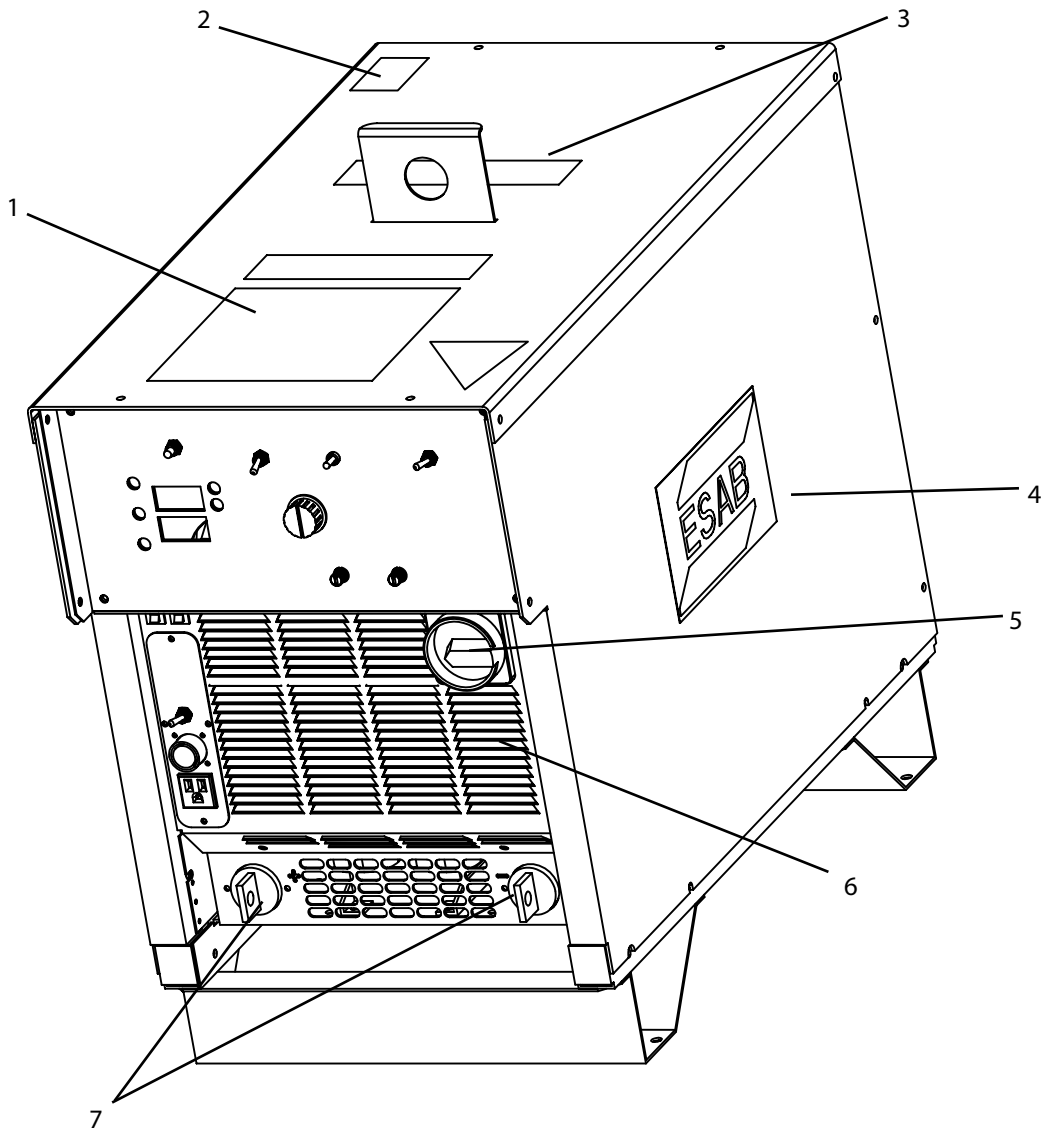
Refer to the Communications Guide located on the back page of this manual for a list of customer service phone numbers.

Note

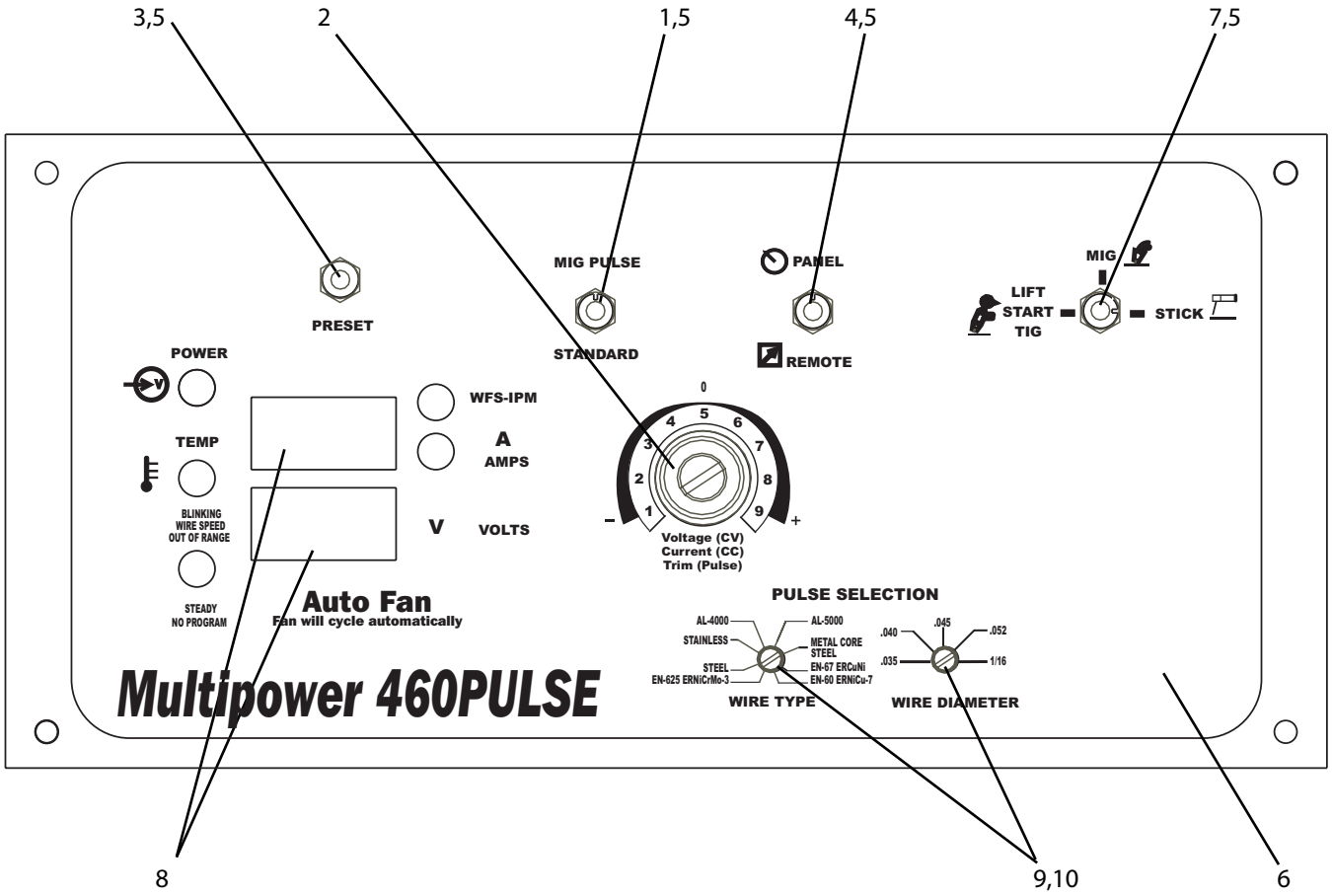
Bill of material items that have blank part numbers are provided for customer information only.
Hardware items should be available through local sources.



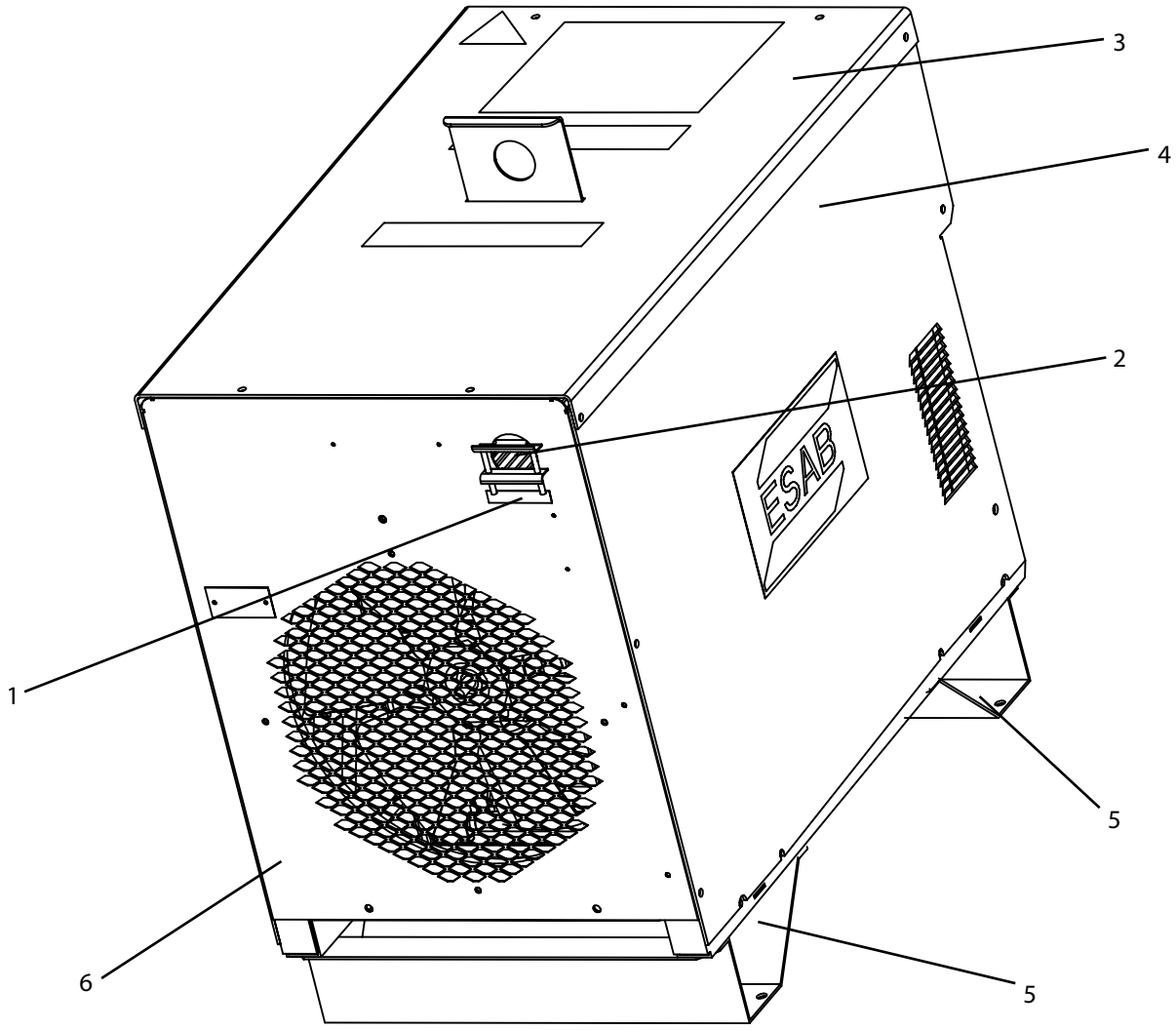
NO.	QTY. REQ.	ITEM NO.	DESCRIPTION	CIRCUIT SYMBOL
1	1	952219	Outlet 110V (Square)	J3
2	1	951916	Connection Box Rcpt. 14FS X-ROT	J8
3	1	634515	SW TGGL SPDT 2 Pos 14A 125V Q/D	S3, 5
4	1	951474	Switch Seal Black	
5	1	32385	Contactor Plate (ShipYard Model)	
6	2	950122	Circuit Breaker 10A 32VDC/250VAC	CB1, 2
7	1	0558004931	Lift Bail	
8	1	951835	Thermal Switch N/O	TS4
9	1	38246	PCB Pulse Shipyard	PCB4
10	1	38211	Control PCB	PCB1
11	1	0558005655	Cap Metal Protection	



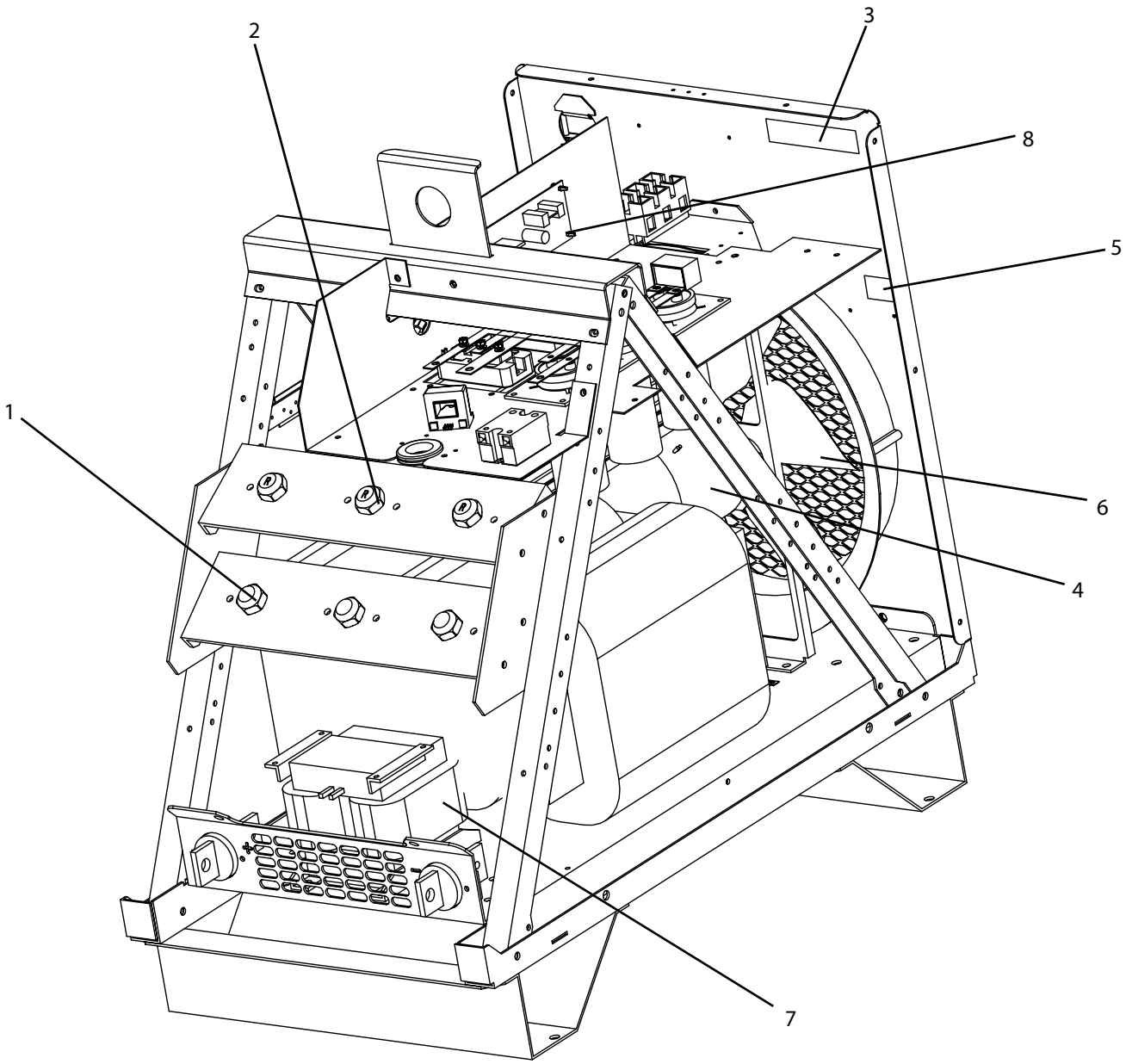
NO.	QTY. REQ.	ITEM NO.	DESCRIPTION	CIRCUIT SYMBOL
1	1	2091514	Label Warning Arc Welding & Cutting	
2	1	954008	Label Danger High Voltage	
3	1	99512240	Label Caution Lifting Eye	
4	1	0558004927	Panel Right Side	
5	1	950945	SW Pwr Disc 100A 600V	S1
6	1	0558001363	Panel Front	
7	2	678025	Terminal Assembly	



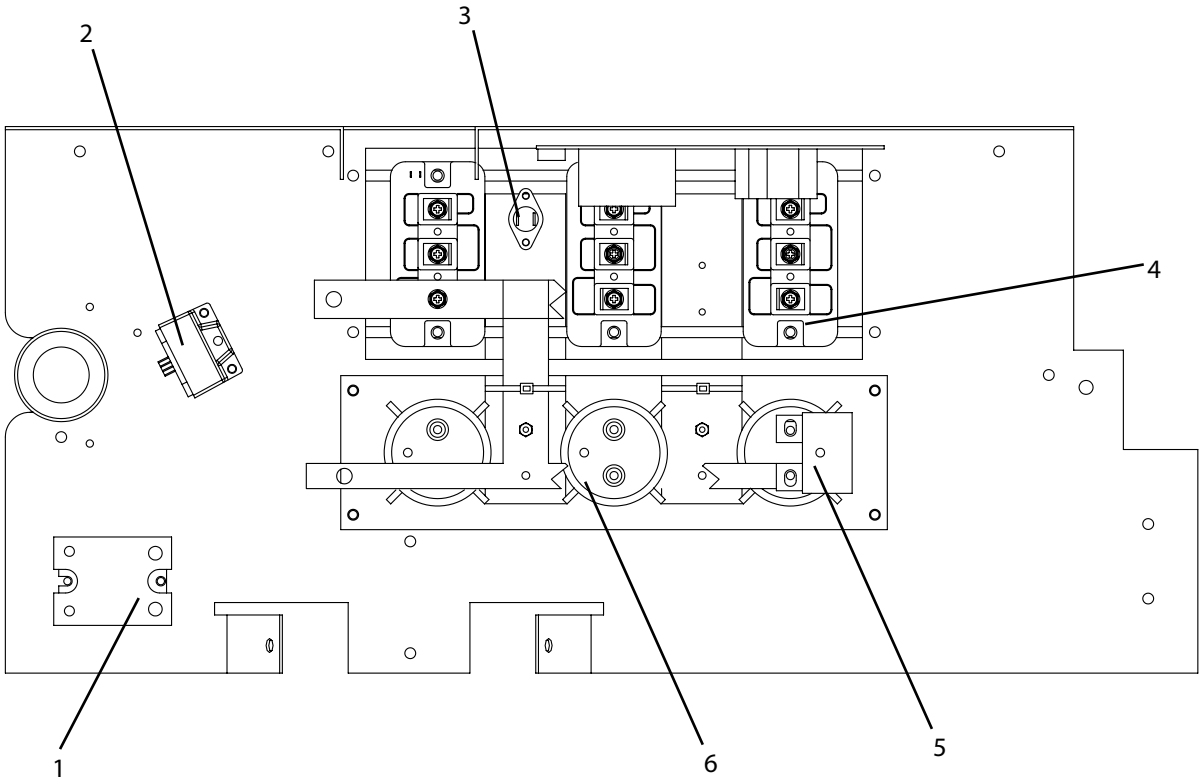
NO.	QTY. REQ.	ITEM NO.	DESCRIPTION	CIRCUIT SYMBOL
1	1	634519	Switch Toggle 4PDT	S6
2	1	0558001818	Knob 1.31 Dia	
	1	0558001176	Pot Lin *10.0K 2.00W 0.88L (A & B)	R1
3	1	952895	Switch PB Normally Open	S4
4	1	634515	Switch TGGL SPDT 2 POS 14A 124V Q/D	S3
5	4	951474	Switch Seal, Black	
6	1	0558004923	Panel, Front (Silkscreened)	
7	1	636702	Switch Toggle 3PDT	S2
8	1	38196	PCB Display Assembly	PCB2
9	2	0558001595	Knob Ribbed Body 1/8 Hole	
10	2	38222	PCB Pulse Switch	PCB5



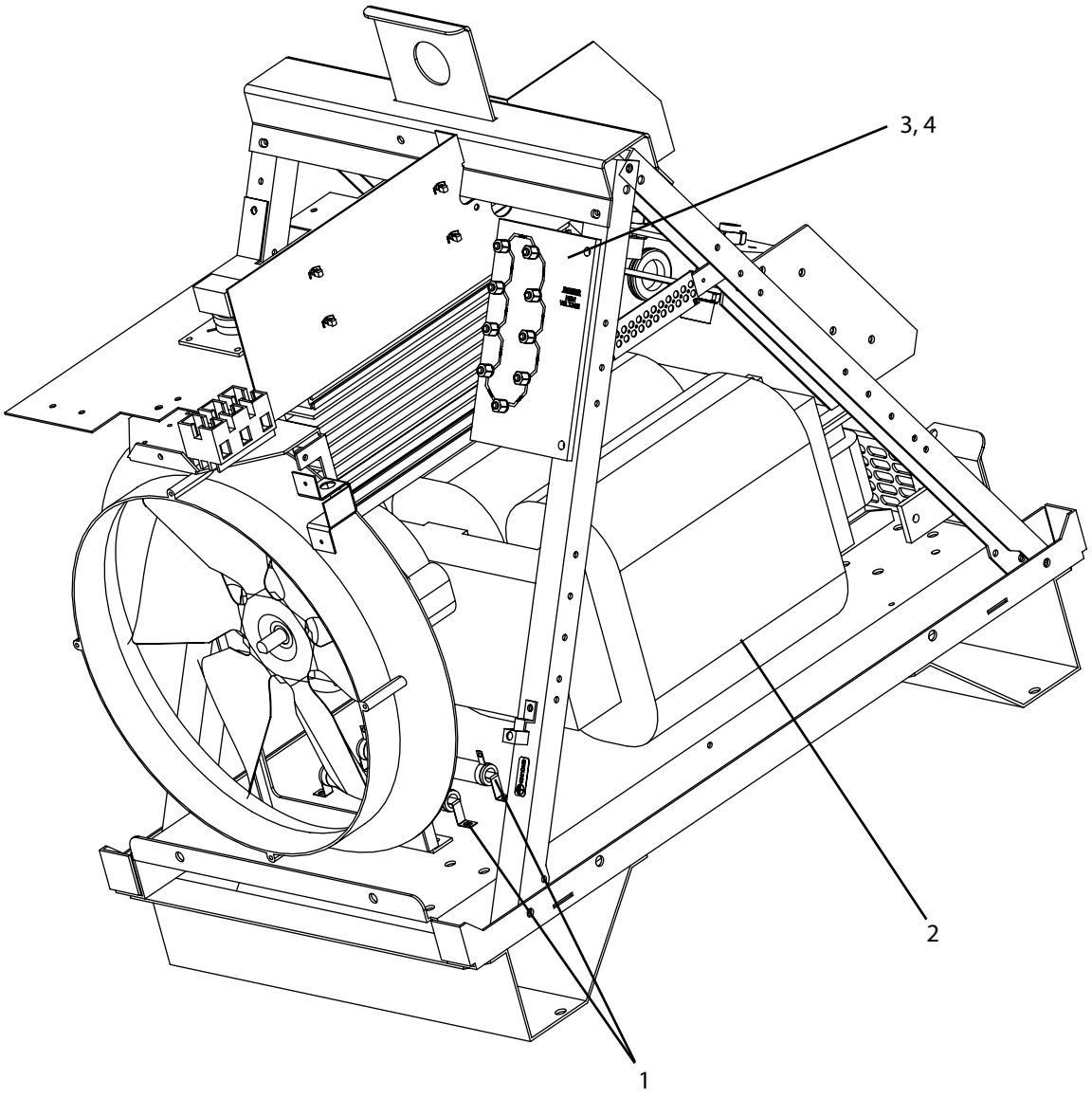
NO.	QTY. REQ.	ITEM NO.	DESCRIPTION	CIRCUIT SYMBOL
1	1	13732733	Label for Install Use COP Wire	
2	1	950219	Relief Strain 2" (Non-enclosed)	
3	1	0558004926	Panel Top Kydex Env	
4	1	0558004925	Panel Left Side Kydex Env	
5	2	0558003490	Foot Skid	
6	1	0558001364	Panel Rear 16 GA ENV	



NO.	REQ.	QTY. NO.	ITEM DESCRIPTION	SYMBOL
1	3	99511916	Diode Fwd 200V 250A	D1, D3, D5
2	3	99511915	Diode Rev 200V 250A	D2, D4, D6
3	1	954864	Label 3 Phase	
4	1	2062334	Fan Motor 1/3 HP 1625 RPM	M1
5	1	954699	Label Warning Fan Hazard	
6	1	36173	Blade Fan 14" 5(or)6 Fin	
7	1	33939	Inductor 7 Turn	L1
8	1	38186	Driver PCB	PCB3



NO.	QTY. REQ.	ITEM NO.	DESCRIPTION	SYMBOL
1	1	952938	SCR 480V 18A Panel MNT	SSR1
2	1	951997	Transducer Current	SH1
3	1	951085	SW THML D/T 176 15A 120V Q/D	TS6
4	3	0558002557	IGBT 600V/300A	Q1, 2, 3
5	1	951940	Capacitor 1.0 uf 600 VDC 10%	C4
6	3	0558002844	Capacitor 35000 uf 100 VDC	C1,C2,C3



NO.	QTY. REQ.	ITEM NO.	DESCRIPTION	SYMBOL
1	2	17280110	Res WW Fix'd ST 100W 5% 100.00	R3, R4
2	1	0558005169	Transformer 230/460V	T1
3	6	672065	Strap Terminal	
4	1	36091	Board Input Terminal 230/460V	TB1

REVISION HISTORY

1. Preliminary release - 08/2004
2. Released - 09/2004
3. Added IGBT and diode test data in Section 5 and updated schematic package - 12 / 2004
4. Updated schematic package - 07 / 2005, del modified schematic 0558004922 made by J. Devito and replaced by schematic from smartteam per R. Eldridge & D. Griffin on 7/11/05.
5. The 10/2005 revision updates the replacement parts section by adding p/n 0558005655, item 11, metal cap protection and illustration to the front view.

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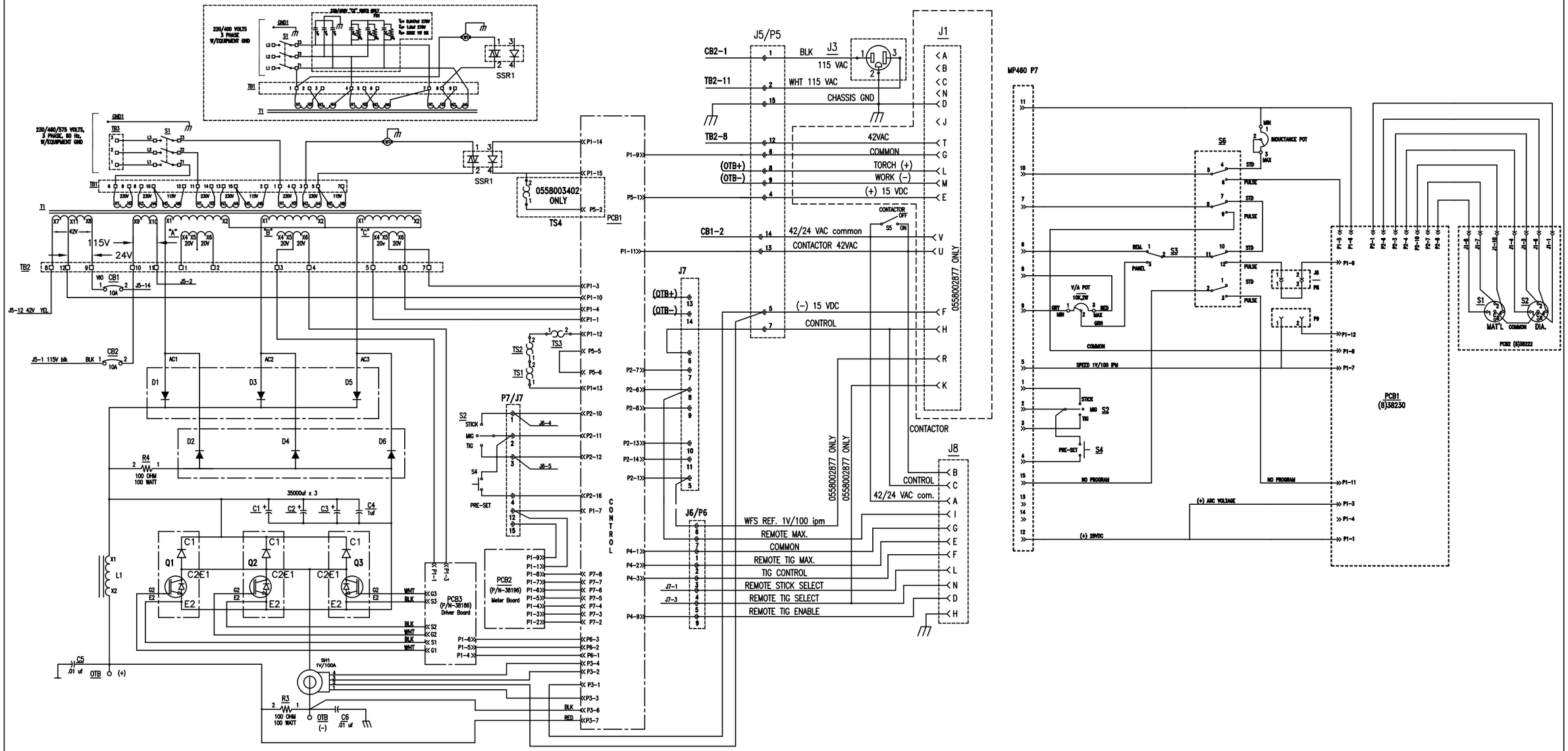
COMPONENT LEGEND

LOCATION NUMBER	ITEM	DESCRIPTION



M	LTR	CHANGE	BY	DATE	CHK'D
	C	CN-043053	TDG	2/19/01	DCG
	B	CN-023214	WAR	6/11/02	WJB
	A	CN-013285	WAR	9/20/01	WJB

ENGLISH DWG. UNLESS OTHERWISE SPECIFIED, DIM ARE IN INCHES.
TOL .XX ± TOL_1
.XXX ± TOL_2
ANGLES ± ANG
SURFACE ROUGHNESS IS IN MICRONCHES
ROUGHNESS FIN
REMOVE ALL BURRS BREAK SHARP EDGES

PA-6100-01-04R2 — RELEASED FOR — 5/22/01 DATE

ESAB WELDING & CUTTING PRODUCTS
FLORENCE SC 29501

TITLE
WIRING_SCHEM_PULSE_460

REPRO MADE FROM
SCALE NONE
SIMILAR TO
FIRST MADE FOR 460_PULSE

DRAWN	CHECKED	APPROVED	SUP.
BY DCG/WAR	BY DCG	BY GWD	SUP. BY
DATE 8/20/01	DATE 8/20/01	DATE 8/20/01	D-0558003034

OCT 1998

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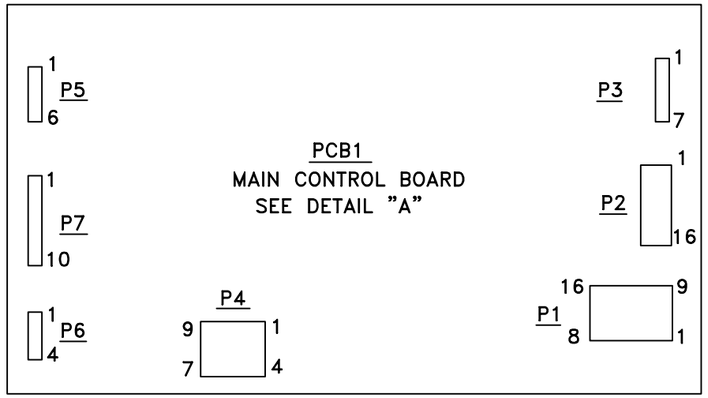
MAIN CONTROL BOARD



Ⓒ

DETAIL "A"
PCB1

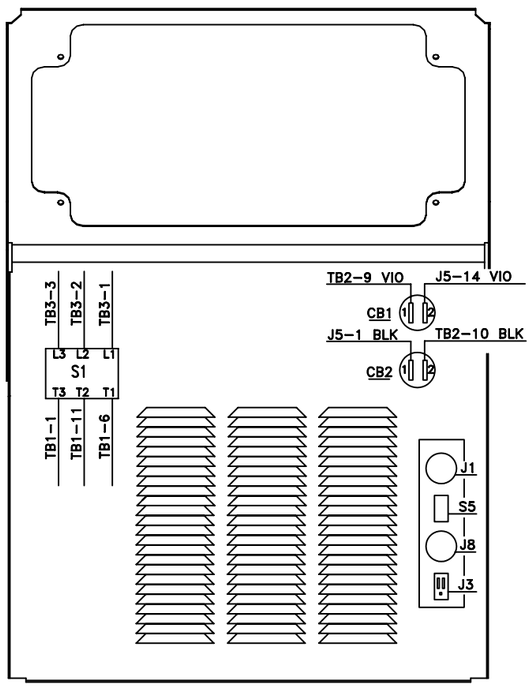
	P1		P2		P3		P4		P5		P6		P7	
1	TB2-5 RED	1	J7-5 BRN	1	J5-5 BLK	1	J6-1 BLU	1	J5-4 RED	1	PCB3 P1-4 BLK	1		
2		2		2	SH1-3 WHT	2	J6-2 ORN	2	TS4-1 BLK	2	PCB3 P1-5 WHT	2	PCB2 P1-2 WHT	
3	TB2-7 ORN	3		3	SH1-1 RED	3	J6-3 WHT	3		3	PCB3 P1-6 RED	3	PCB2 P1-3 RED	
4	TB2-6 GRN	4		4	SH1-4 GRN	4		4		4		4	PCB2 P1-4 GRN	
5		5		5		5		5	PCB1 P5-6 GRY	5		5	PCB2 P1-5 ORN	
6		6	J7-8 RED	6	OTB (-) BLK	6		6	PCB1 P5-5 GRY	6		6	PCB2 P1-6 BLU	
7	J7-12 YEL	7	J7-7 BLU	7	OTB (+) RED	7		7		7		7	PCB2 P1-7 YEL	
8		8	J7-9 BLK	8		8		8		8		8	PCB2 P1-8 BRN	
9	J5-6 GRY	9		9		9	J6-9 BRN	9		9		9		
10	TB2-12 BRN	10	J7-1 VIO	10		10		10		10		10		
11	J5-13 BLK	11	J7-2 YEL											
12	TS3-2 WHT	12	J7-3 GRY											
13	TS1-1 YEL	13	J7-10 WHT											
14	SSR1-3 RED	14	J7-11 VIO											
15	TS4-2 ORN	15												
16		16	J7-4 BLU											

BILL OF MATERIALS

QUANTITIES ARE IN U/M ESTABLISHED BY INVENTORY

SYMBOL	ITEM NO.	PART OR CODE NO.	QTY.	DESCRIPTION

FRONT PANEL REAR



Ⓐ

J1 #	
D	GND-2 GRN #
E	P5-4 RED #
F	P5-5 BLK #
G	P5-6 ORN #
H	P5-7 YEL #
K	P6-5 BLU #
L	P5-8 BRN #
M	P5-9 BLK #
R	P6-6 YEL #
T	P5-12 YEL #
U	S5-2 RED #
V	S5-1 VIO #

S5	
Ⓐ 1	J1-V VIO #
1	J8-A VIO
1	P5-14 VIO
2	J8-B RED
Ⓐ 2	J1-V RED #
2	P5-13 RED

J8	
A	S5-1 VIO
B	S5-2 RED
C	P5-7 YEL
D	P6-9 ORN
E	P6-2 BLK
F	P6-3 WHT
G	P6-1 BRN
H	GND-2 GRN
I	P6-7 GRY
L	P6-4 RED
N	P6-5 BLU

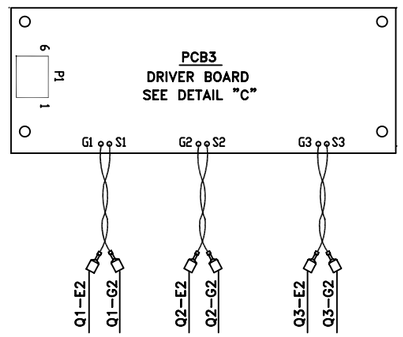
J3	
1	P5-1 BLK
2	GND-2 GRN
3	P5-2 WHT

	C	CN-043053	TDG	2/19/04	DCG
	B	CN-033214	SMC	9-5-03	M.P.
	A	CN-023214	WAR	6/11/02	WJB
M	LTR	CHANGE	BY	DATE	CHK'D

RIGHT SIDE VIEW

DETAIL "C"
PCB3
P1

1	TB2-3 GRY
2	
3	TB2-4 BLU
4	PCB1 P6-1 BLK
5	PCB1 P6 -2 WHT
6	PCB1 P6-3 RED



Ⓐ NOTES:

1. • DENOTES SPLICE.
2. ✱ DENOTES SELF LEAD.
3. # DENOTES 0558002669, 0558002877, & 0558003401 ONLY.

REFERENCE DRAWINGS:
SCHEMATIC DIAGRAM: 0558002702
WIRE KIT: 0558002700 & 0558002720
CABLE/HOSE KIT: 0558002722

SHT 1 OF 3

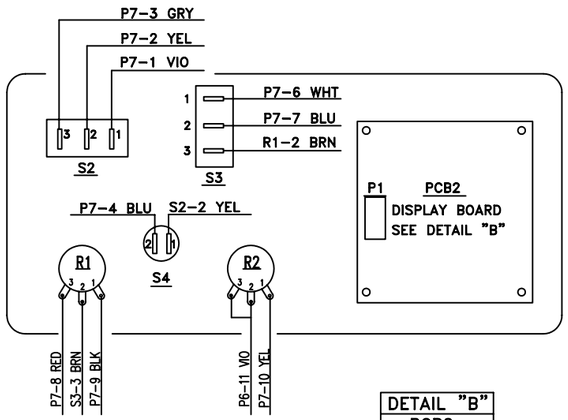
ENGLISH DWG. UNLESS OTHERWISE SPECIFIED, DIM ARE IN INCHES. TOL. .XX ± .015 .XXX ± .005 ANGLES ± 1° CHAMFERS & C'SINKS 82° SURFACE ROUGHNESS 125 IN MICROINCHES. REMOVE ALL BURRS BREAK SHARP EDGES	PA 6100-01-04	8/21/01
	PA-6113-00-01	1/26/00
	RELEASED FOR	DATE
	ESAB WELDING & CUTTING PRODUCTS FLORENCE, SC 29501	
	TITLE WIRING DIAGRAM MP460	
	REPRO MADE FROM	
SCALE NONE	SIMILAR TO	
FIRST MADE FOR MM260		SUP.
DRAWN BY WAR DATE 9/12/01	CHECKED BY EEP DATE 9/12/01	APPROVED BY GWD DATE 9/12/01 / SUP. BY
		D-0558003064

OCT 1999

D-0558003064

THIS DRAWING CONTAINS PROPRIETORIAL INFORMATION OF ESAB WELDING & CUTTING PRODUCTS AND IS LOANED WITH THE EXPRESS AGREEMENT THAT THIS DRAWING (1) WILL NOT BE REPRODUCED OR COPIED, (2) WILL NOT BE USED OTHER THAN IN WORK FOR ESAB WELDING & CUTTING PRODUCTS AND (3) WILL NOT BE DISCLOSED EXCEPT TO EMPLOYEES OF THE PARTY TO WHOM THIS DRAWING IS LOANED AND ON A CONFIDENTIAL BASIS.

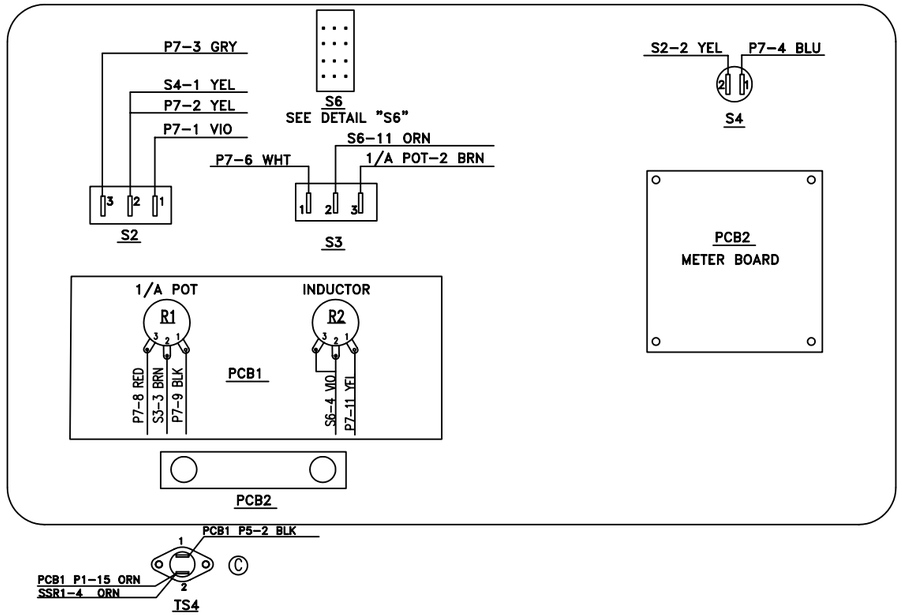
(STANDARD) CONTROL PANEL REAR

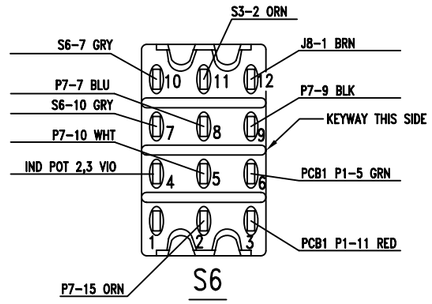


P1	
1	P7-12 RED
2	
3	P7-12 RED
4	
5	S6-6 GRN
6	P7-11 VIO
7	P7-5 BRN
8	S6-9 BLK
9	J8-2 BLU
10	
11	P6-1 RED
12	P9-2 BLU

DETAIL "B" PCB2 P1	
1	J7-12 YEL
2	PCB1 P7-2 WHT
3	PCB1 P7-3 RED
4	PCB1 P7-4 GRN
5	PCB1 P7-5 ORN
6	PCB1 P7-6 BLU
7	PCB1 P7-7 YEL
8	PCB2 P7-8 BRN
9	PCB2 J7-15 ORN

(PULSE) CONTROL PANEL REAR



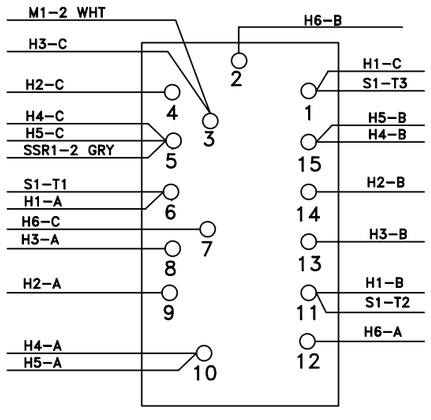


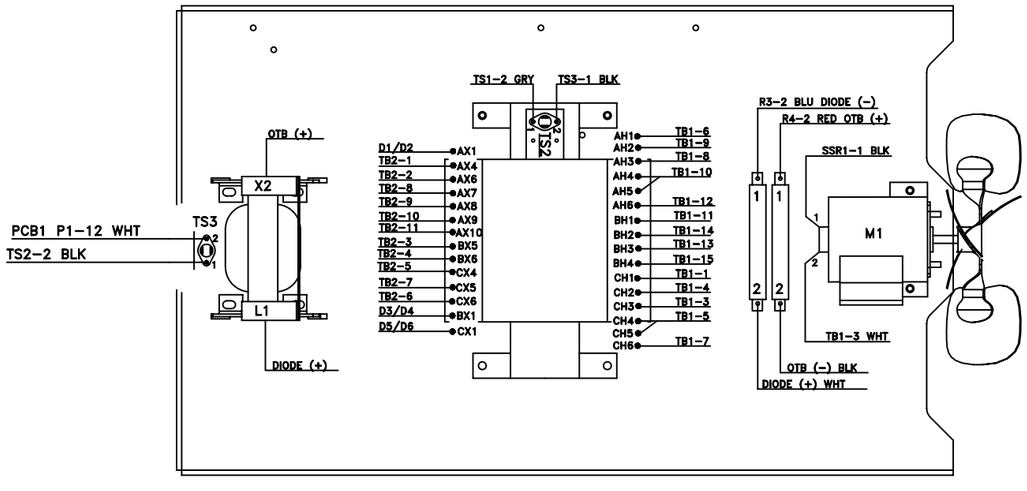
BILL OF MATERIALS

QUANTITIES ARE IN U/M ESTABLISHED BY INVENTORY

SYMBOL	ITEM NO.	PART OR CODE NO.	QTY.	DESCRIPTION

(208)230/460/575V





BASE TOP VIEW

NOTES:

1. • DENOTES SPLICE.
2. ✱ DENOTES SELF LEAD.
3. # DENOTES 0558002669 & 0558002877 ONLY.

Ⓐ

M	LTR	CHANGE	BY	DATE	CHK'D
	C	SEE SHEET ONE			

ENGLISH DWG. UNLESS OTHERWISE SPECIFIED, DIM ARE IN INCHES. TOL. .XX ± .015 .XXX ± .005 ANGLES ± 1° CHAMFERS & C'SINKS 82° SURFACE ROUGHNESS IS IN MICRORINCHES. ✓ REMOVE ALL BURRS BREAK SHARP EDGES	PA 6100-01-04	8/21/01	
	PA-6113-00-01	1/26/00	
	RELEASED FOR	DATE	
	ESAB WELDING & CUTTING PRODUCTS FLORENCE, SC 29501		
	TITLE WIRING DIAGRAM MP460		
	REPRO MADE FROM		
SCALE NONE	SIMILAR TO		
FIRST MADE FOR MW280	SUP.		
DRAWN BY WAR DATE 9/12/01	CHECKED BY EEP DATE 9/12/01	APPROVED BY GWD DATE 9/12/01	SUP. BY
			D-0558003064

OCT 1995

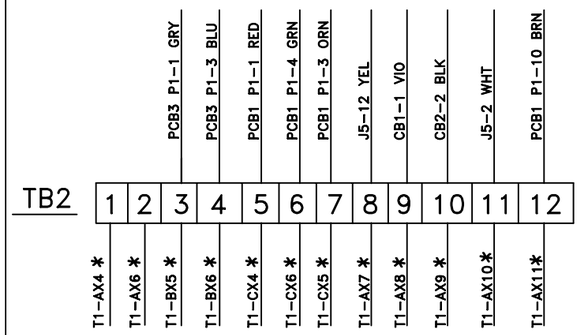
D-0558003064

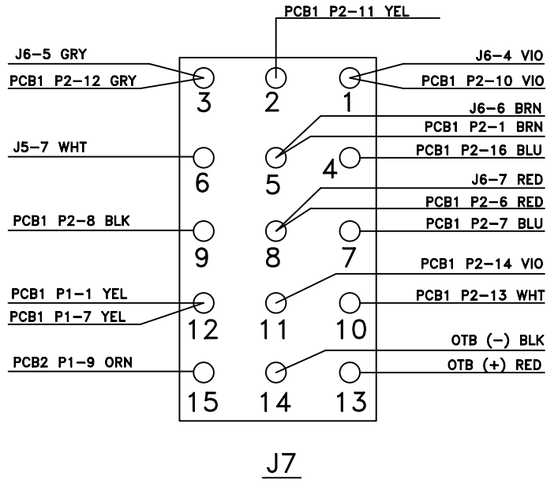
THIS DRAWING CONTAINS PROPRIETORIAL INFORMATION OF ESAB WELDING & CUTTING PRODUCTS AND IS LOANED WITH THE EXPRESS AGREEMENT THAT THIS DRAWING (1) WILL NOT BE REPRODUCED OR COPIED, (2) WILL NOT BE USED OTHER THAN IN WORK FOR ESAB WELDING & CUTTING PRODUCTS AND (3) WILL NOT BE DISCLOSED EXCEPT TO EMPLOYEES OF THE PARTY TO WHOM THIS DRAWING IS LOANED AND ON A CONFIDENTIAL BASIS.

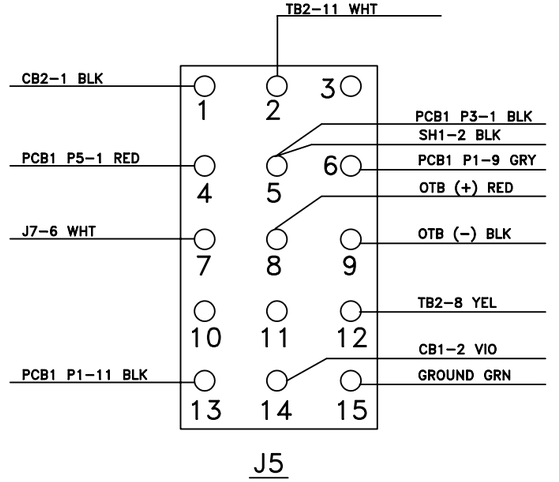
BILL OF MATERIALS

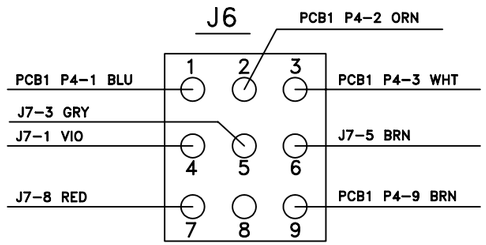
QUANTITIES ARE IN U/M ESTABLISHED BY INVENTORY

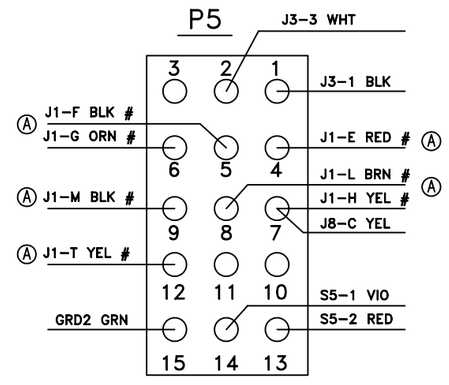
SYMBOL	ITEM NO.	PART OR CODE NO.	QTY.	DESCRIPTION

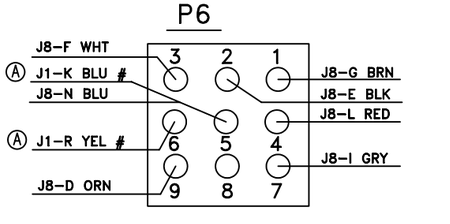


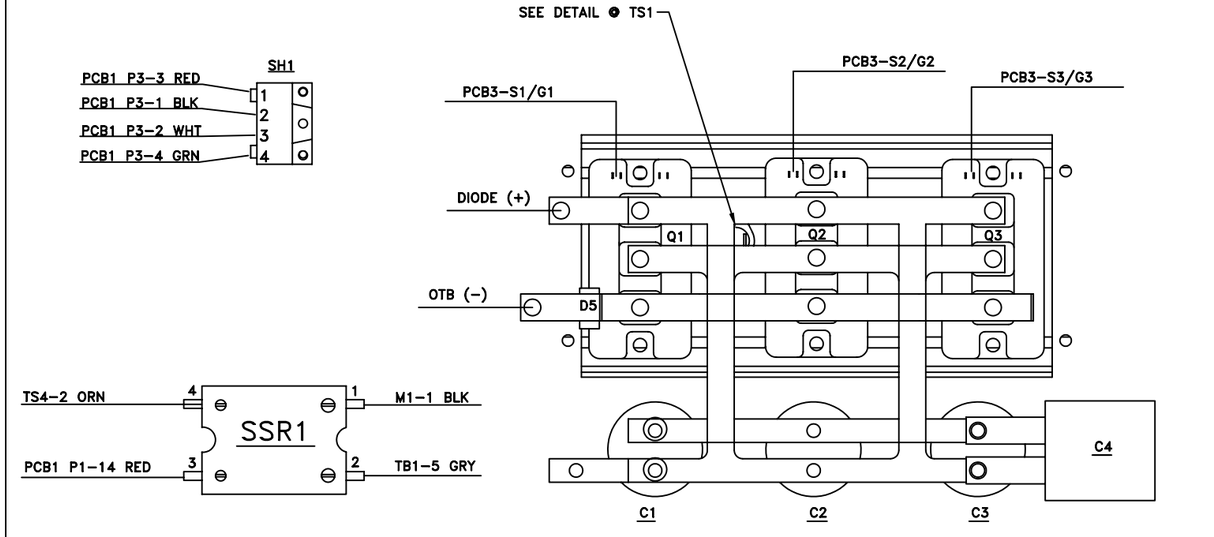












M	LTR	CHANGE	BY	DATE	CHK'D
	C	SEE SHEET ONE			

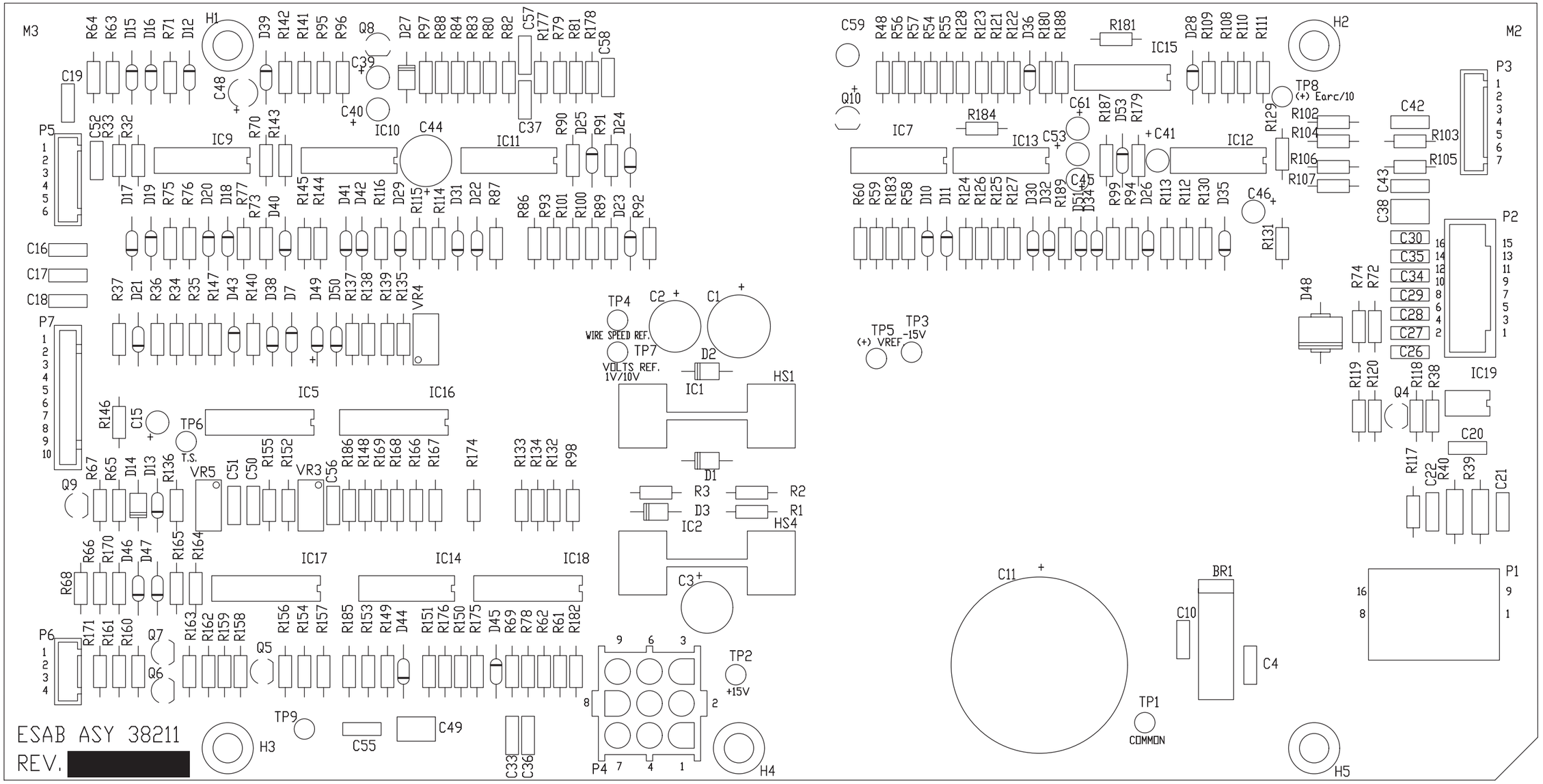
NOTES:

1. ● DENOTES SPLICE.
2. ✱ DENOTES SELF LEAD.
3. ⒷⒶ # DENOTES 0558002669, 0558002877, & 0558003401 ONLY.

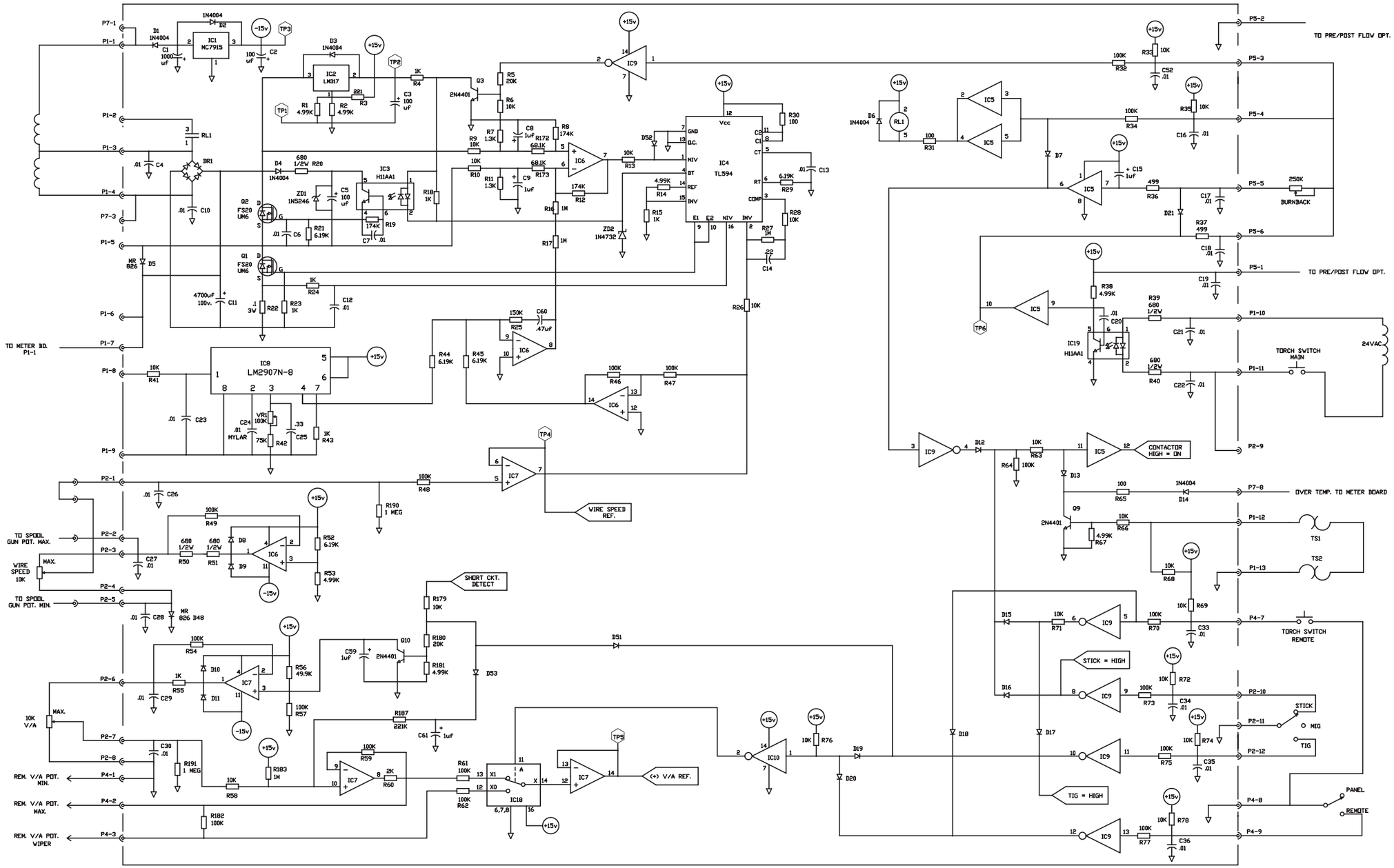
SHT 3 OF 3

ENGLISH DWG. UNLESS OTHERWISE SPECIFIED, DIM ARE IN INCHES: TOL. .XX ± .015 .XXX ± .005 ANGLES ± 1° CHAMFERS & C'SINKS 82° SURFACE ROUGHNESS IS IN MICROINCHES. REMOVE ALL BURRS BREAK SHARP EDGES	PA 6100-01-04	8/21/01
	PA-6113-00-01	1/26/00
	RELEASED FOR	DATE
	ESAB WELDING & CUTTING PRODUCTS FLORENCE, SC 29501	
	TITLE: WIRING DIAGRAM MP460	
	REPRO MADE FROM	
SCALE NONE	SIMILAR TO	
FIRST MADE FOR MW280		SUP.
DRAWN BY WAR DATE 9/12/01	CHECKED BY EEP DATE 9/12/01	APPROVED BY GWD DATE 9/12/01
		SUP. BY
		D-0558003064

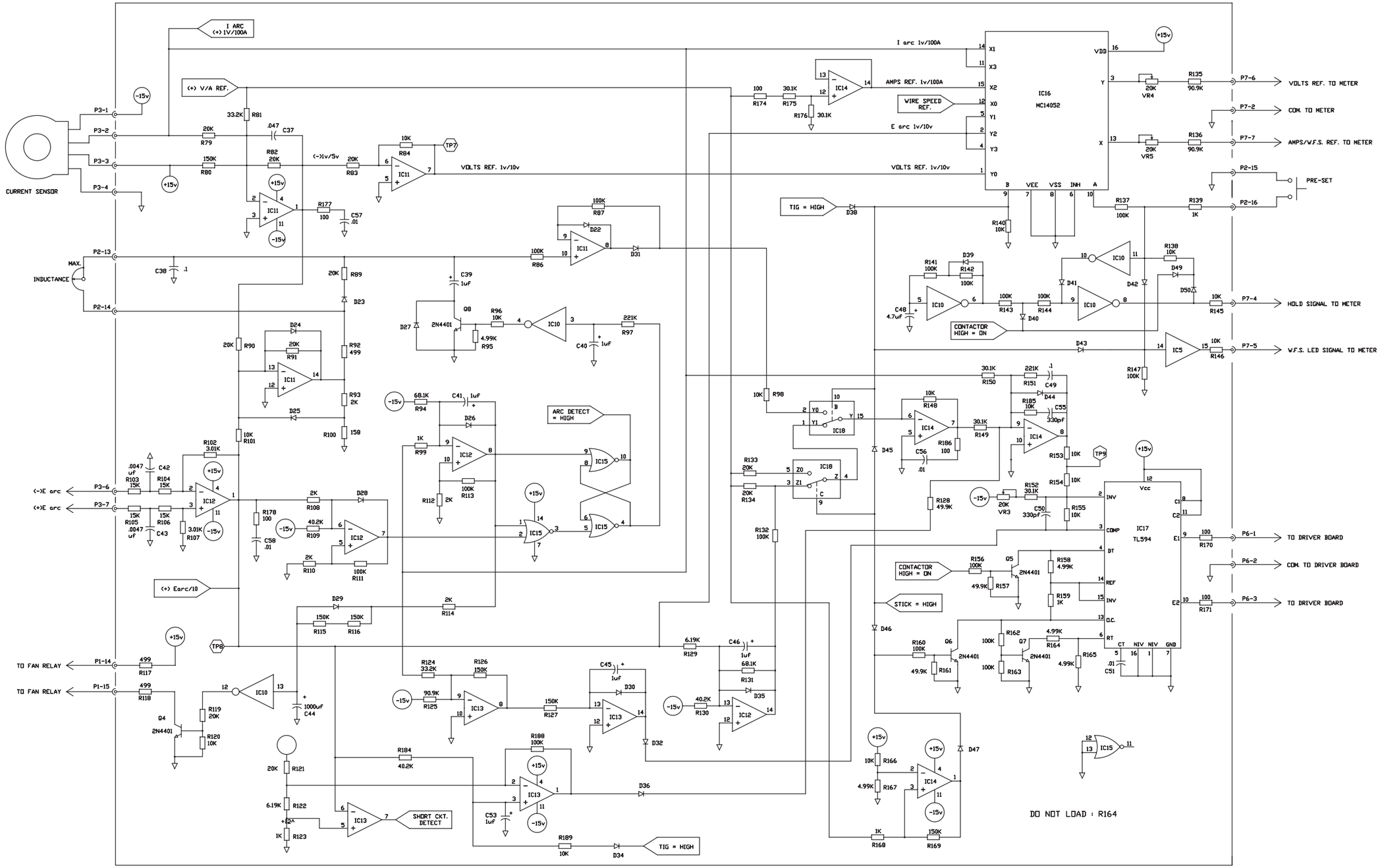
OCT 1995



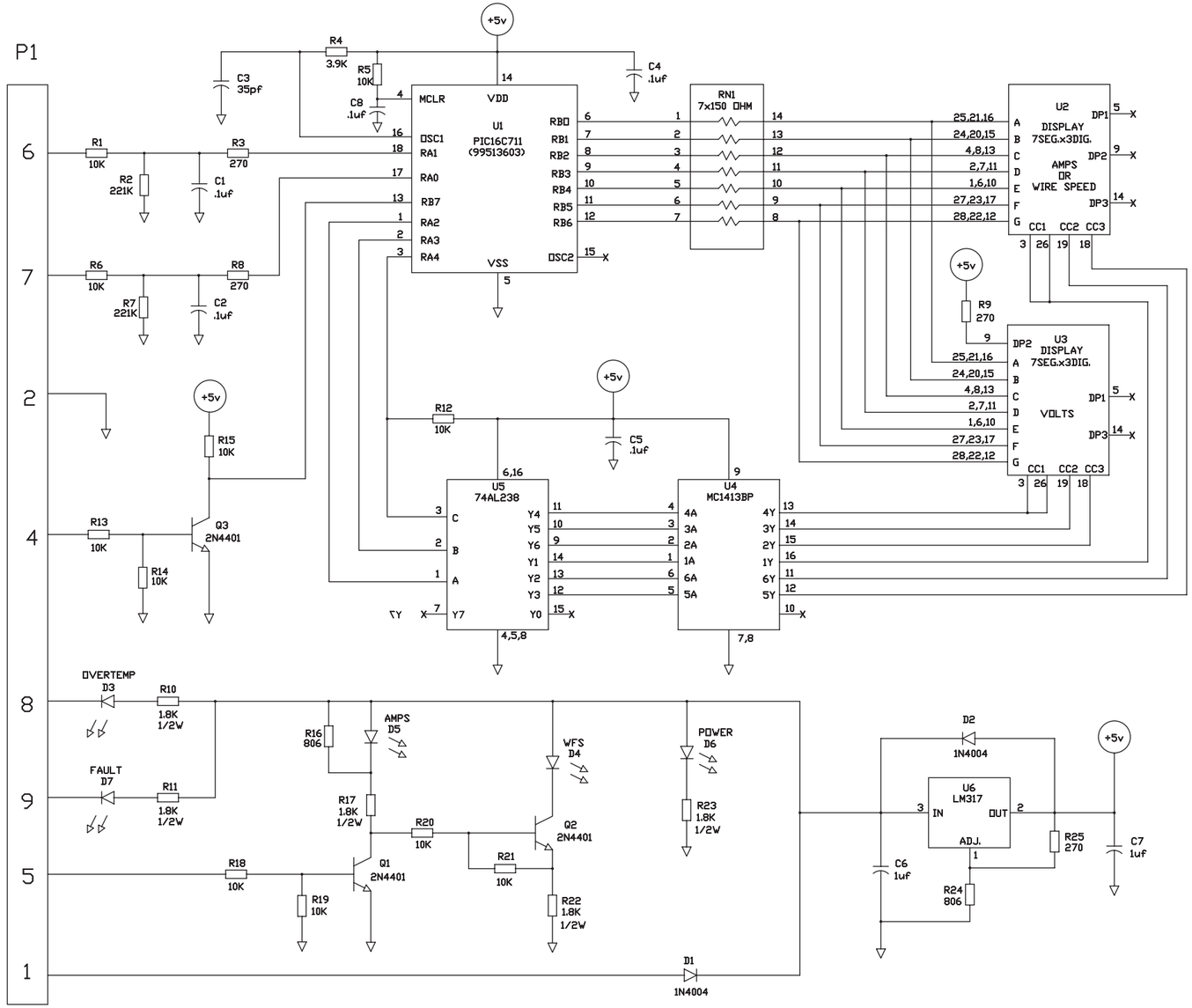
MultiPower 460 PULSE (Shipyard Model) Control PCB PN-(8)38211 Sheet 1 of 3

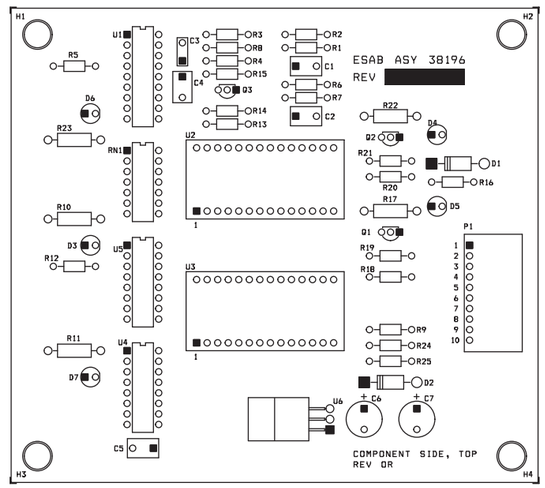


MultiPower 460 PULSE (Shipyard Model) Control PCB PN-(8)38211 Sheet 2 of 3

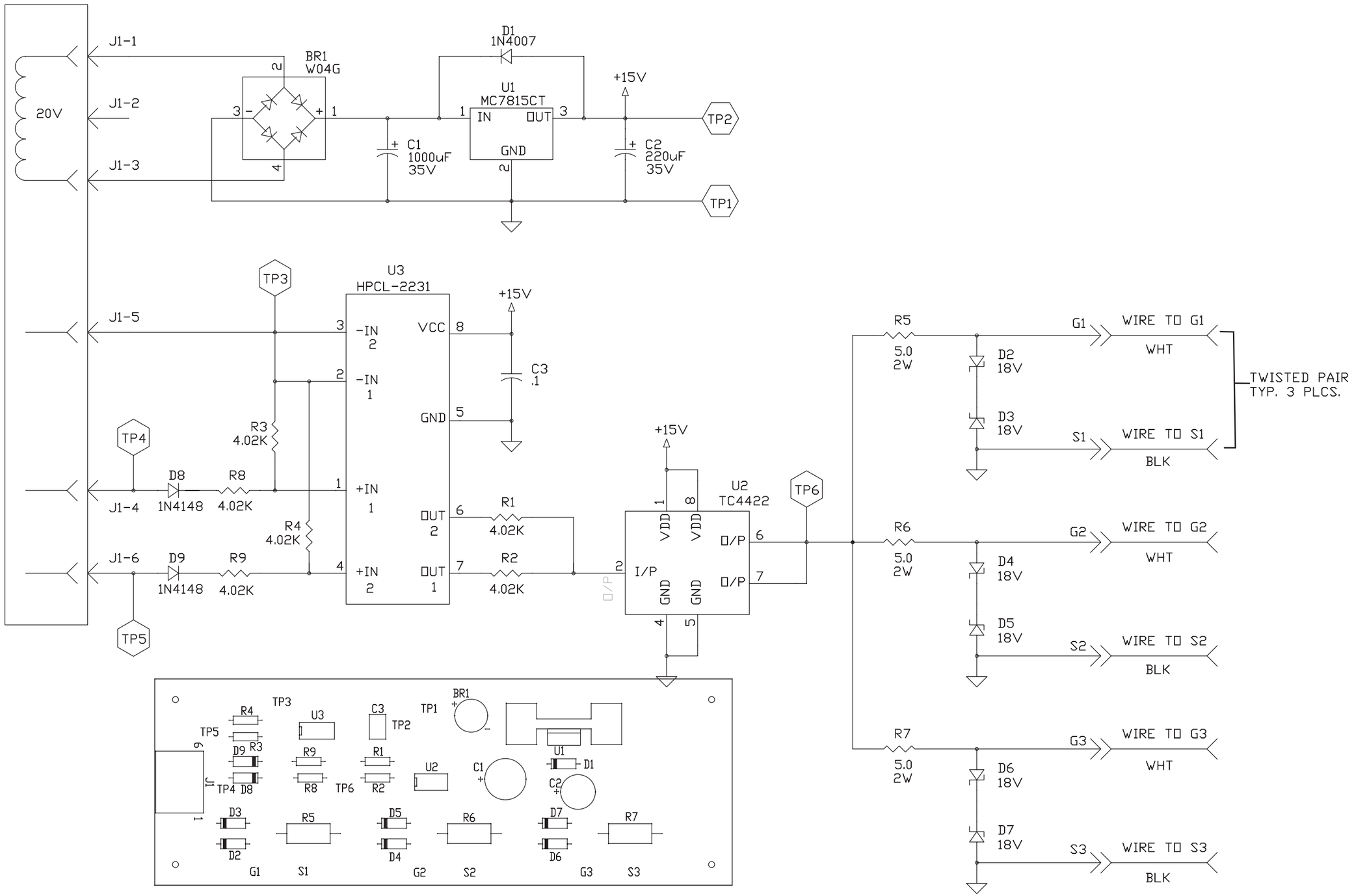


MultiPower 460 PULSE (Shipyard Model) Control PCB PN-(8)38211 Sheet 3 of 3





MultiPower 460 PULSE (Shipyard Model) Display PCB PN-(8)38196



MultiPower 460 PULSE (Shipyard Model) IGBT Driver PCB PN-(8)38186